ISTANBUL BILGI UNIVERSITY
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# THE USE OF AUTOMATED JOURNALISM IN THE TURKISH MEDIA:
# AN OBSERVATION OF ITS PRESENT AND FUTURE.

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The Use of Automated Journalism in The Turkish Media:
An Observation of Its Present and Future.

Türk Medyasında Otomatik Gazetecilik Kullanımı:
Bugünü Ve Geleceğine İlişkin Bir Gözlem.

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## TABLE OF CONTENT

## ABSTRACT

This paper aimed to question if there were current automated journalism techniques in Turkish media and whether the journalists were in support of new technologies. With a focus on interviews with professionals who have worked in several areas of the media companies in Turkey, the paper concluded that automated journalism is uncommon in Turkey. Most journalists have limited knowledge of the subject and/or pessimism about using such technology. The journalists also criticized certain practices in the Turkish media and the problems such as unemployment, political pressures, lack of funding, and despair towards the profession's future. This paper is notable due to its concentration on Turkish professionals in traditional or internet journalism and content creation. It also did not distinguish among the journalists according to their ranks, titles, and/or status. Still, to fully comprehend the opinions of the journalists and the practices of automated journalism techniques, an on-site observation and interview process is also needed. The paper also concludes that, based on international studies, there is a need for reskilling and upskilling for many industries, including journalism, to prevent mass unemployment and adapt to new jobs created due to automation which may lead the path for productivity and competition in Turkey and worldwide.



**Keywords:** “Automated journalism”, “Data journalism”, “Artificial Intelligence”, “Robot Journalism”, “Journalism in the Future”.

# ÖZET

Bu tez çalışması, Türk medyasında güncel otomatik habercilik teknikleri olup olmadığını ve gazetecilerin yeni teknolojileri destekleyip desteklemediğini sorgulamayı amaçlamıştır. Türkiye'deki medya şirketlerinin çeşitli alanlarında çalışmış profesyonellerle yapılan röportajlara odaklanan makale, otomatik gazeteciliğin Türkiye'de yaygın olmadığı sonucuna vardı. Çoğu gazeteci ya konuyla ilgili sınırlı bilgiye sahiptir ya da bu tür teknolojilerin kullanımı konusunda karamsardır. Gazeteciler, Türk medyasındaki bazı uygulamaları ve işsizlik, siyasi baskılar, kaynak yetersizliği ve mesleğin geleceğine yönelik umutsuzluk gibi sorunları da ele almaktadırlar. Bu tez çalışması, geleneksel veya internet gazeteciliği ve içerik oluşturma alanlarında çalışmış veya çalışmakta olan Türk profesyonelleri üzerinde yoğunlaşması nedeniyle dikkate değerdir. Ayrıca gazeteciler arasında rütbe, unvan ve/veya statülerine göre bir ayrım yapılmamıştır. Yine de gazetecilerin görüşlerinin ve otomatik habercilik teknikleri uygulamalarının tam olarak anlaşılabilmesi için yerinde gözlem ve görüşme sürecine de ihtiyaç duyulmaktadır. Çalışma ayrıca, uluslararası araştırmalara dayanarak, Türkiye ve dünya çapında kitlesel işsizliği önlemek ve otomasyon sayesinde yaratılan yeni işlere uyum sağlamak için gazetecilik de dahil olmak üzere birçok endüstri için yeni becerilerin kazanılmasına ihtiyaç olduğu sonucuna varıyor.

**Anahtar Kelimeler:** “Otomatik Gazetecilik”, “Veri Gazeteciliği”, “Yapay Zeka”, “Robot Gazeteciliği”, “Gelecekte Gazetecilik”.

# INTRODUCTION

The act of creation is an ontological problem in itself. How does one create anything? How does a sculptor carve, a painter transforms colors into an almost lively human? How can a human describe the ever-changing events of nature? Even though there are several studies concerning these centuries-long questions, it could be argued that there are still no concrete answers for the act of creative endeavors. The inquiry also deepens when the act of creating a product with the capability of thinking and maybe even feeling, but in the form of a mechanical or mathematical entity, comes into perspective. Human beings have the capacity to form artificial intelligence, a direct representation of their own intelligence that helps them to create further. Even though it is called "artificial," its creations can also be considered authentic and tangible as what humans can do. The once-unimaginable narratives of science-fiction novels and movies have now become realities of modern and postmodern life. Today, while humanoid robots seem to be still far from happening, some algorithms can write and paint, gradually more like what humans write and paint. And there is also the question of aesthetics; what makes any creation of art, technology, or science more beautiful, more credible, or more beneficial than the others, and who judges them?

This paper questions if these forms of artificial intelligence can also question and have curiosity, like any human journalist, with the aim of comprehending if they will be able to do so in the future. In the event of the emergence of these new forms of intelligence, what would happen to human journalists? The primary purpose of this research is to comprehend the use of automated journalism techniques in Turkish media. This thesis aims to discover the international studies focusing on the analysis of the news and the media companies to construct an argument about the use of automation systems and whether they could be pivotal in terms of eliminating fake news and/or assisting the journalists with fact-checking. Since this research is based on the Turkish media, several studies are examined in terms of their approaches and methodologies toward the subject to extract data and construct

valid arguments for the use of algorithms, automated fact-checking tools, and automated content creation.

Moreover, it should not be forgotten that journalism is not an art form, it is more likely to be considered a branch of social sciences and sometimes a highly criticized field, full of technical details and ideological constraints, and it can be argued to be gradually and mainly having a focus on profit rather than objectivity. The field of journalism can also be considered to have many challenges for most human journalists. What about the "robot" journalists? Will they only focus on gathering profit for the media companies, or will they aim to inform the public honestly? What will happen to misinformation?

Automated journalism is inherently related to the competition between the old technology and the new, which had been an ongoing debate for centuries about nearly all the emerging new technological innovations, starting from Socrates' fervent opposition against the act of writing (Plato, 551), or Luddites in the Industrial Revolution, which as an organization of skilled workers against the disturbances that the technologies created in their societies (Conniff, 2011).

This study is significant in terms of focusing on select professionals from Turkey who work in newspapers and/or internet websites focusing on content and news. It can be argued that this study is also unique in terms of not contacting experts on the subject but random professionals who volunteered to take part in the study, even though they sometimes indicated that they have no experience.

# 1. METHODOLOGY AND AIM

## 1.1.Research Questions, Hypothesis, And Aim

The research questions of this study can be summed up as such;

RQ1: How do Turkish journalists, editors, and fact-checkers working in news organizations anticipate the future of automated journalism on a global and national scale? Is any automation software in use currently in Turkish media?

RQ2: Can automation help journalists complete routine tasks and fact-checking? What are the possible advantages and disadvantages of automation?

RQ3: If a news text is written, edited, and or checked by automation software, whose liability should be considered in terms of journalism ethics and authority? Is it possible for the audience to detect a text written by automated software?

RQ4: Can software systems increase journalists' creativity and/or speed? For which articles could automated software be advantageous the most?

Hypothesis:

H1: Some of the observable practices in the journalism environment in Turkey would probably hinder the advancement of automated journalism practices.

H2: Some journalists may be prejudiced against using “robots” in the sector because they fear losing their jobs.

The main objective of this research is to predict the future of Turkish journalism in terms of analyzing the establishment of a solid system for fact-checking and writing. Natural language processing (NLP), machine learning, knowledge representation, and databases will also be investigated in terms of their potential to avert fake news, bring a new perspective to journalism, and assist journalists in the news writing processes.

## 1.2. Methodology

In light of this research, several interviews were analyzed to question the use of automated journalism in Turkish news organizations and discuss the advantages, disadvantages, and dangers of automation in journalism. Interviews with the journalists in several national newspaper organizations such as Hurriyet, Sozcu, Birgün, Sabah, Cumhuriyet, and so forth, as well as Turkish journalists and independent media organizations, were organized by the author to discuss the future of journalism by analyzing the challenges of Turkish journalism and its consequent needs, as well as the current tools and software used for fact-checking and news writing, as well as the liability chain. Interviewees were decided with a convenience technique and some limited snowball techniques. Contact with more than two hundred journalists regarding their opinions about the use of automated journalism in Turkish journals only led to detailed interviews with twenty-one journalists, reporters, researchers, and Search Engine Optimization (SEO) specialists were interviewed.

Out of two hundred journalists, more than twenty journalists answered that they do not have any information concerning the subject, and more than ten of them forwarded the interviewer to the Information Technology (IT) or Search Engine Optimization (SEO) departments of their institutions, indicating that this subject is more in tune with that professions. In addition to two hundred journalists, more than one hundred SEO professionals, content managers, and editors of the journals were also contacted, but only ten answered. The rest did not respond. The work emails, Twitter, and Linkedin direct messages were used while contacting the professionals in the sector, and interviews were conducted with those who volunteered to participate in the study. The interviews were conducted through messaging, e-mails, voice recordings, and via the video conferencing program Zoom.

Here are the questions that were asked to reporters:

1. Do you think robots and artificial intelligence programs will be able to do journalism in the future? What do you think would be the possible advantages and disadvantages of this?

2. Are there applications that research or write articles with machine learning or artificial intelligence programs today? Do you have information?
3. How do you think a robot becomes a journalist? Is it possible? Can robots succeed in helping journalists do their routine work? For example, controlling resources, processing data, etc.
4. What personality traits and professional approaches are most needed to be a journalist?
5. Are articles written only by programming languages compliant with journalistic ethics?
6. Who do you think will be legally responsible for the article written entirely by a program? To whom can we state the article belongs?
7. In which branches of journalism do you think these programs are widely used? In which areas can it not be used?
8. What do you think should be considered before using such programs? Do articles written by these programs also need to be edited before being published?

## 2. LITERATURE REVIEW

The introduction of computer science into social sciences and journalism and the use of computer programming for social media tools, fact-checking tools, data mining tools, data collection tools, and even grammar checking, translation, and transcription tools with a focus on English have been heavily researched in recent years, including the automated journalism practices in the US and UK.

Automated journalism is often and somewhat wrongly referred to as "robot journalism," as well; even though the term "robot" is used to introduce the concept to all better, it is misleading since there are no physical elements in such practices, as the body of a robot, conducting journalistic practices. It instead defines the automation of specific journalistic tasks.

In the article "Data-Driven Journalism and The Public Good: Computer-Assisted-Reporters and Programmer-Journalists in Chicago," the authors, Parasie and Dagiral (2012) indicate that:

> *The role of computer scientists in journalism has increased significantly since the mid- 2000s. Mostly in the United States and Great Britain, some news organizations have hired programmers – often calling themselves "programmer-journalists" – to produce innovative online news products (Daniel and Flew, 2010; Royal, 2010). Several leading newspapers (e.g., The New York Times, The Guardian), as well as independent news organizations (e.g., ProPublica), have set up dedicated teams within their newsrooms, specifically to design so-called "news applications." These innovative contents, consisting of online presentations, interactive maps, or visualizations, rely on a wide range of computer techniques used to collect, process, analyze and visualize data sets.* (p.2)

According to Montal and Reich (2016), the authors of the article "I, Robot. You, Journalist. Who is the Author?" automated journalism, through the use of algorithms, has significant importance for politics, legal issues, journalism, and the audiences (p. 1). They summarize how automated journalism works as such, "These algorithms are able to generate textual and visual journalistic content automatically

and (to some extent) autonomously (p.1)" making a huge part of the future of journalism (p.3), contributing to several steps in journalism practices, and content production. For the authors, automated journalism can "(1) locate and identify relevant data in databases and other data sources; (2) "clean" and categorize the raw data; (3) identify key facts while prioritizing, comparing, and aggregating the data; (4) organize" (p.3).

Per the authors of the article "The Robotic Reporter in The Czech News Agency: Automated Journalism and Augmentation in The Newsroom" (2020), "artificial intelligence or automated journalism are currently used in several areas in journalism – for collecting information (structured data, processing unstructured information), verifying information, creating texts, visualizations and graphics, and for targeted distribution of information" (p. 38).

Once defined, the questions about automated journalism quickly transform into hopes or threats of the potential results of automation in this industry. These results can be summarized as optimistic and pessimistic, respectively focusing on the advantages and the disadvantages of using automation in journalism.

Optimistic Hypothesis:

- These tools will enable journalists to acquire innovative new tools to improve the quality of news coverage, reporting, and storytelling (Ombelet et al., 2016, p. 5).
- They will also assist human editors in editing and writing news copies (Ombelet et al., 2016, p.16).
- Innovation in the media companies (Ombelet et al., 2016, p.5).

Pessimistic Hypothesis:

- The rise of ethical concerns such as threats to personal privacy, opening newsrooms to hacking threats, and the end of human journalism (Ombelet et al., 2016, p.16).
- The possibility that the automated may end several jobs (Vincent, 2018).
- The potential that automated journalism may lead to a misinformation environment further deteriorated.

In recent years, the media itself published content about the rise of automated journalism tools, companies, and software. Tim Adams' article in *The Guardian* newspaper (Adams, 2015) features an interview and a commentary with Kris Hammond, co-founder and chief scientist of Narrative Science, which focuses on creating tools for automated journalism. Hammond argues that (Adams, 2015), the company is "humanizing the machine and giving it the ability not only to look at data but, based on general ideas of what is important and a close understanding of who the audience is, we are giving it the tools to know how to tell us stories" and also believes that "a computer will write 90% of the news articles by 2030, and one of these computers will win a Pulitzer Prize".

Resources for journalists to teach automated journalism practices, algorithms, and machine learning can be summarized as Google's tools such as the Data Commons, Fact Check Tools, Advanced Protection Program, The Common Knowledge Project, Data Commons, Data Set Search, Flourish, Google Data GIF Maker, Google Public Data Explorer, Google Trends, Outline, Pinpoint, Project Shield, Realtime Content Insights, and Tilegrams. Hemingway and Grammarly are also tools popular among journalists, academics, and writers, and they proofread the writings of the journalists. Many websites aggregate personalized stories and news according to the interests and activities of the users, such as Digg, Stumbleupon, and Technorati.

Another project from the industry is Meta's journalism project which, according to its website, has the aim of;

- *Building community through news by working with and investing in organizations that have the ability to fund the journalistic projects and help build sustainable futures for the journalist communities.*
- *Training newsrooms globally by offering online courses to train journalists.*
- *Partnering with news publishers and nonprofits to fight against misinformation*. (Meta, 2022)

According to "Google News Initiative's Introduction to Machine Learning" course, created in collaboration with Google News Initiative, The London School of Economics and Political Science, Journalism AI, and vrt News, machine learning

allows journalists more freedom by conducting repetitive tasks for name and let them work on more complex, time-consuming and investigative stories (GNI, p. 5).

There is limited research conducted in and about Turkey for the use of automated journalism in Turkey. The main one is the study of Bilge Narin Şenyüz, who conducts interviews with experts in the technology industry and computer scientists. According to her research, automated journalistic techniques exist in large-scale newsrooms for the practices of election results, weather reporting, earthquakes, and traffic conditions (Narin, p. 94). In contrast, the financial difficulties in small-scale media institutions inhibit the practices of such automated journalism techniques. Narin begins her article with an interpretation of Jung and argues that since journalists have developed a professional mindset, they perceive themselves as a different group of people than society (Jung et al. 2017, p. 292). The research highlights significant results: for example, according to Hakan Kara (Narin, p. 94), a bot detects the dataset of Kandilli Observatory and reports the earthquake news. Hakan Kara also believes that automated journalism is not used much in Turkey due to inactivity, even though the software is not hard to create. Another journalist İsmail Hakkı Polat argues that automated journalism does not have and cannot have journalistic integrity, objectivity, or ethics (p.94). Badger Akbay also adds that these algorithms lack the human connection.

On the other hand, Cem Say asserts that even though interaction is complicated, it may be possible in the future. About the use of the automated algorithms techniques, Erkan Saka claims that the practices of automated journalism may be limited to Europe and America only due to the constant pressure to be objective at all times and for all matters (p. 95). And last but not least, Mustafa Kuleli argues that those, who are not investigative journalists, will lose their jobs to automation (p. 94). [1]

[1] The article was translated by the author from Turkish to English.

## 2.1. Artificial Intelligence (AI) Techniques, Machine Learning, And Natural Language Processing (NLP)

Many concepts in the field of artificial intelligence tend to be quite sophisticated; therefore, for this thesis, rather than delving into mechanics, they will be summarized shortly, and instead, the focus will be on their functions, especially in journalism. According to *Merriam Webster Dictionary* (2021), *artificial intelligence* has several definitions:

1) *An area of computer science that deals with giving machines the ability to seem like they have human intelligence;*.
2) *The power of a machine to copy intelligent human behavior; a robot with artificial intelligence*

   *or;*

- *A branch of computer science dealing with the simulation of intelligent behavior in computers.*
- *The capability of a machine to imitate intelligent human behavior.*

As abstract as they may sound, these definitions could be expanded through some of the thoughts of several thinkers. For Öykü İyigün (2021), for example, it can be defined as "the capacity of the technological devices to imitate human intelligence" (p. 2). According to Meltem Öztürk (2021), artificial intelligence is the science of making computers clever, in the sense of the cleverness of human beings (p. 54-55). For Martin Minsky (1968), artificial intelligence is the science of creating machines that, in the case of requirement, would be able to take the actions that humans are typically expected to do (p. 1). On the other hand, Margeret Boden (2016) defines the concept as the techniques that computer systems have to use in order to understand human thoughts (p. 1). For Amaravadi, Samaddar, and Dutta (1995), the purpose of artificial intelligence is to ease human life, increase the quality of human life the productivity in the industry, decrease work accidents, create strategies, and improve the problem-solving abilities of humans (p. 4-13).

Several system definitions regarding the scientific sphere of artificial intelligence should also be summarized to deepen the meanings. Artificial intelligence has three forms (Duran, p. 33);

- Weak artificial intelligence or narrow artificial intelligence is designed to complete a specific task. It is nowadays used to help humans complete specific tasks through the use of algorithms in the banking, finance, and service sectors.
- General artificial intelligence has the ability to learn and act like a human mind.
- Strong artificial intelligence works beyond human intelligence and has the rational ability.

Artificial intelligence also embodies machine learning and deep learning (Yilmaz, p. 97). Similar to how humans learn a piece of new information, machines also learn through repeated actions and experience by using the information gathered by data. As a part of artificial intelligence, machine learning algorithms are also effective in automated journalism techniques. According to "Google News Initiative, Introduction to Machine Learning,"; "machine learning is a subcategory of the umbrella term "artificial intelligence" (p. 11), and;

> *Machine learning answers questions by using data. Algorithms are used to learn patterns from data and gradually perform certain tasks through the information it collected from the data. Strikingly, machines learn quite similarly to humans who learn through their mistakes and improve their performances step by step.* (p.10)

Machine learning is also divided into different categories:

- Supervised learning: a group of inputs is introduced to the system. The system gradually learns the input and output values and produces the closest results according to the goals, such as the weather prediction algorithms.
- Unsupervised learning: patterns are found in the input flows without the goals and categorize the input values in terms of their relations with each other, such as social media algorithms and detecting spam e-mails.

- Reinforcement learning: a behavioral learning method by receiving feedback from the analysis of data, algorithm direct the user to the best result, such as robotics and autonomous vehicles. (Yilmaz, p.99)

Similarly, deep learning is a subcategory of machine learning based on artificial neuron systems (Say, p. 103). Artificial neurons work through the definition of the problem, gathering the data, organizing the data, creating artificial neural networks, as well as the test and the verification processes (Say, p. 103).[2] Another field connected to machine learning and deep learning, NLG (Natural Language Processing), is used to make artificial intelligence create written or audio narratives using a dataset (Öztürk, p. 55). Yilmaz summarizes it as "training computers to write and understand the human speech (Yılmaz, p. 99)."

The use of the automated systems can also be summarized as such:

- *Bioinformatics, biological engineering, biomechanics, drug discovery, genetics/genomics, medical imaging, medical informatics, neuroscience/neurorobotics, nutrition/food science, public health;*
- *Internet of things (IoT), smart cities, social networks;*
- *Customer service, e-commerce;*
- *Aerospace/avionics, autonomous vehicles, driver/vehicle recognition, transportation, and traffic engineering;*
- *Anomaly detection/surveillance, authentication, cybersecurity, privacy/anonymity*
- *Computer networks/internet, radio, and television broadcasting videoconferencing, and many more*. (WIPO Technology Trends 2019, p. 26-27).

Google News Initiative indicates that significant developments in the AI field occurred in the last decade due to:

- *Huge amounts of data being created every minute.*
- *Processing speeds that allow computers to make sense of all this information much more quickly.* (p.12)

[2] Translated and paraphrased by the author, from Turkish to English.

GNI also states that just like human journalists do, machines that learn and use machine learning to work in journalism should also be fair and value the ethical principles of journalists (p. 42-45).

### 2.2. Artificial Intelligence Timeline

Without not getting into technical details, a brief history regarding the history of artificial intelligence is necessary to comprehend better the complexities of the subject and its link with the social sciences.

- Sixth century BCE: The Workshops of the Greek God Hephaestos from The Iliad describes humanoid robots (McCorduck, p. 4-5);
  *These are golden, and in appearance like living young women.*
  *There is intelligence in their hearts, and there is speech in them and,*
  *Strength, and from the immortal gods they have learned how to do things.*
  (Lattimore, 1951).

Hephaestos is also argued to be the architect of Talos, a man of bronze who is in charge of protecting the beaches of Crete, and Pandora, commissioned by Zeus to punish the humans.

- Late First Century CE: Heron of Alexander built fabled automata and other mechanical marvels (McCorduck, p. 4-5).
- Greek mythological story of Pygmalion: In Ovid's narrative poem Metamorphoses, Pygmalion was a sculptor who fell in love with a statue he had carved, called Galatea, which is an allegory for the creative power of human beings (Ovid, trans. Lombardo, 2010).
- El Cabir, El Cezari: As a Muslim polymath from the Artuq Dynasty of Jazira in Mesopotamia, Ismail al Cezari is a scholar, inventor, mechanical engineer, artisan, artist, and mathematician who is best known for *The Book of Knowledge of Ingenious Mechanical Devices* in 1206. The topmost significance of his book is that it described fifty mechanical devices, leading him to be described as the “father of robotics” and modern-day engineering (Brittanica, 2013).

- 15th century CE: Ramon Llull invented his Ars Magna, “a machine for discerning truth, based on the Arabic zairja he had seen. Zairja was based on a scheme whereby the twenty-eight letters of the Arabic alphabet represented Arap philosophy's twenty-eight classes of ideas. By combining numerical values assigned to classes and letters, some sort of insight was reached” (McCorduck, p. 10). “Ars Magna was also based on the assumption that human thought could be mechanized” (McCorduck, p. 37).
- 15th-16th century CE: Mechanical clocks in European towns and their gradual automation to be set and fixed (McCorduck, p. XXIV).
- 1642: Pascal invented a mechanical calculator called the Pascaline (McCorduck, p. XXIV).
- 1664: Descartes’ Treatise on Man was published and discussed the mind and body problem. Descartes argued that animals are machines (McCorduck, p. 40).
- 1673: Leibniz invented an improved mechanical calculator and “envisioned a universal calculus of reasoning to decide arguments mechanically” (McCorduck, p. XXV). According to Cem Say, Leibniz is one of the first computer engineers in history. Following the lead of Blaise Pascal, who was the inventor of the first mechanical calculator, Leibniz, in the 17th century, built a calculator which he called “calculus ratiocinator” and which is capable of computing all four operations. In parallel time with Newton, Leibniz also theorized mathematics's derived and integral functions (Say, p. 15). [3]
- 1770: The Turk, von Kempelen, also known as the Mechanical Turk, was mainly a machine constructed for fake chess-playing. Constructed in 1770 by Wolfgang von Kempelen to impress the Empress Maria Theresa of Austria, the automaton was an early example of the imagination of the machine-building, even though it was eventually revealed to be a hoax (Schaffer, 1999).

[3] Translated by the author from Turkish to English.

- 1822: Babbage began but never finished the Difference Engine (McCorduck, p. XXV).
- 1843: Ada Lovelace published her account of Babbage's Analytical Engine, asserting that "the Analytical Engine has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform." (McCorduck, p. XXIV).
- 1854: Boole published *An Investigation of the Laws of Thought* (McCorduck, p. XXIV), "intended to formalize "the laws of thought" with his algebra" (p. 120). Logic and calculus were intertwined through his theory. The use of 0 and 1, corresponding to "TRUE" and "FALSE," in logical thought and mathematical representation (Say, p. 18). [4]
- 1914: A. Torres y Quevedo built electromechanical machines for chess endgames (McCorduck, p. XXIV).
- 1923: Although it was vaguely imagined 200 years ago, the word robot only came into the world in the early 1920s. Karel Capek used the word robot for the first time in a theatre play. In the Czech language, the word is derived from the word "robota," which means "serf labor" or "hard work" in Czech, as well as simply "work" or "labor" in many Slavic languages (McCorduck, p. XXIV).
- 1928: Hilbert and his student Ackermann called the mathematical world to find a mechanism (which is called an algorithm now) which is capable of detecting whether a logical premise can be proved or not, using a particular axiom, which can be defined as "an unprovable rule or first principle accepted as true because it is self-evident or particularly useful (Merriam-Webster, 2022). Turing argued that there was no such algorithm, and it was impossible to make such a logic machine (Say, p. 24-27). [5]

[4] Translated by the author from Turkish to English.

[5] Translated by the author from Turkish to English.

- 1937: Alan Turing proposed an abstract about a universal computing machine (McCorduck, p. XXIV).
- 1938: Konrad Zuse "realized the technology he developed in Berlin, a Z1 computer, would eventually become an artificial brain" (McCorduck, p. XXV).
- 1939: Elektro is the nickname of the first robot that could move and walk. Built by Westinghouse Electric Corporation in Mansfield, Ohio, between 1937 and 1938, the humanoid robot, made of a steel gear, cam, and motor skeleton covered by aluminum skin, was able to walk by voice command, speak about 700 words, smoke cigarettes, blow up balloons and move its head and arms (IEEE Spectrum, 2018).
- 1940: The inventor of the fictional "robot laws," Isaac Asimov's novella *I Robot* was a critical imagination for the emergence of the first artificial neurons, humanoids, and the first computers, as well as the fictional "robot laws," which led the path to contemplations about the ethical and practical ways robots can be used for and alongside with humans. Three Robotic Law is as such;
  1) *A robot may not injure a human being or through inaction, allow a human being to come to harm.*
  2) *A robot must obey the orders given to it by human beings except where such orders would conflict with the First Law.*
  3) *A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.* (McCorduck, p. 25-26)
- 1941: "Automatic decryption of German intelligence messages undertaken by Turing and others at Bletchley Park, England" (McCorduck, p.XXV). The father of computer science and the founder of the science of artificial intelligence, Alan Turing, is one of the most prominent scientists of the 20th century. As a polymath, Turing was also a war hero in WW2, not due to his

success on the battlefield but in the field of deciphering the enigmatic hidden messages of Nazi Germany (Say, p. 28). [6]

- 1956: Artificial intelligence as a term was used for the first time by John McCarty at the Dartmouth Conference (McCorduck, p. XXVI).
- 1959: Kilby and Noyce independently applied for the U.S. patents for an integrated circuit (McCorduck, p. XXIV).
- 1965: ELIZA, considered the first chatbot, works similar to a therapist. ELIZA, which can also learn from the inputs of humans, is one of the first examples of the early natural language processing computer program. Created between 1964 to 1966 at the MIT Artificial Intelligence Laboratory by Joseph Weizenbaum, it aimed to prove that the communication between a human and a computer would be superficial (McCorduck, p. 223).
- In the late 1970s: personal computers (PC) became available for customers (CNET, 2009).
- 1997: IBM's Deep Blue beat the world chess champion after a six-game match (IBM, 2022).
- 2010: SIRI was developed as an Apple application (Huffpost, 2013)
- 2015: AlphaGO beat the European champion in the game of GO (Wired, 2016).

### 2.3. Philosophies Behind Artificial Intelligence

Artificial intelligence also has a great place in philosophy; its boundaries cannot be all covered in a master's thesis, but some understanding of how different social sciences approach it can be significant for comprehending that artificial intelligence is not only a technical field but also, and arguably more, a philosophical and sociological concept.

[6] Translated by the author from Turkish to English.

> *To know intelligence well enough to be able to build a working model of it is surely one of the most intellectually exciting and spiritually challenging problems of the human race.* (McCorduck, p. 135)

Through artificial intelligence, McCorduck argues that humans can identify themselves better and amplify their capacities (McCorduck, p. 135). The link between humans and artificial beings is also a story of the self and the other, the alien, which undoubtedly creates a power relationship (p. 195) and some terror and excitement (p. 198). It can also be considered a Freudian urge to divide the self and copy oneself in the form of another, as Haraway (1991) and McCorduck argue (p.3; p. 135).

McCorduck also questions if machines should think or if human beings can also be considered as machines, and the possibility of an intelligent artificial grasp power in the future, as well as the mind-body problem and the observation that language, is an essential feature of humans, (p. 278-379; p. 490). Human intelligence is arguably superior to all the other species, and mammals might be due to the ability to use language, according to Pagar (2017, p. 624). However, like many complex issues, intelligence also has several definitions for different thinkers. For Holstein and Foley, intelligence is about the ability to adapt to changing environments (p. 4). On the other hand, Hoffman suggests that intelligence is connected to the structures of the neurons in the brain and the speed of the transmission between different neurons.

As for creativity, for example, Bruce Buchanan (2001), an artificial intelligence scientist, argues that "AI is the perfect medium for understanding creativity because implementing ideas in computer programs gives us the means to test these ideas (p. 490)." Moreover, as the inventor of Lateral Thinking as a thinking and creativity tool, Edward de Bono asserts that "there is no doubt that creativity is the most important human resource of all. Without creativity, there would be no progress, and we would be forever repeating the same patterns (Karagül; Cengiz, p. 170)."

Also, it can be argued that technology is not as hopeful as one hopes. While it was supposed to be a medium for improving human rights, democracy, and the general wellness of humans, it can also be argued that it has several hindrances. For

example, according to the author of *Atlas of AI*, Kate Crawford, "AI is neither artificial nor intelligent" (2021, p. 7), but "it is rather, both embodied and material made from natural resources, fuel, human labor, infrastructures, logistics, histories, and classifications" (p. 7). Moreover, she also argues that "AI systems are not autonomous, rational, or able to discern anything without extensive, computationally intensive training with large datasets or predefined rules and rewards" (p. 7). Several forces affect the development, improvement, and implementation of AI systems; therefore, it is an extension of the power systems in societies, governments, and states and "the economic, political, cultural, and historical forces that shape it" (p. 7). Her definition is strikingly different than the ones we have discussed beforehand,

> *Artificial intelligence, then, is an idea, an infrastructure, an industry, a form of exercising power, and a way of seeing; it's also a manifestation of highly organized capital backed by vast systems of extraction and logistics, with supply chains that wrap around the entire planet. All these things are part of what artificial intelligence is—a two-word phrase onto which is mapped a complex set of expectations, ideologies, desires, and fears*. (p. 31)

Artificial intelligence can also be discussed in terms of media studies. For example, according to Marshall McLuhan, media was an extension of the human senses, "that our human senses, of which all media are extensions, are also fixed charges on our personal energies (1995, p. 21). However, there are also several critiques against McLuhan's argument, namely that media is not completely distinct from the environment, for Jussi Parikka, as an example, media is not an extension of Earth itself, being dependent on geological processes and transformations. Artificial intelligence is dependent on electricity, lithium, and ion mines, as well as oil and gas reserves (Crawford, p. 31).

# 3. AUTOMATED JOURNALISM

## 3.1. Automated Journalism Applications in The World, Background, And Significance of Research

Once, there were a handful of people, dates, important events, and journalistic research and narration attributes. The romantic concept of a journalist, thus, mostly involved a pen and a small notebook, like an ideal image of a detective or a watchdog; the journalist would detect the essential pieces of a story that is worth telling in the newspapers. However, the increase in the datasets' amounts is dramatically larger in quantity than what would fit into a pocket notebook, let alone a desk or even a room full of dossiers.

Journalism has been defined by scholars as a "discipline of verification" to separate it from "entertainment, propaganda, fiction, or art" (Shapiro et al., 2013; Thorne et al., 2018). In "Data-Driven News Generation for Automated Journalism" (2017), Leppänen, Munezero, Granroth-Wilding, and Toivonen indicate that they identified *"*a set of six requirements (e.g., transparency, accuracy, modifiability) that should be considered when developing NLG systems for the newsroom," and "the majority of news generation efforts have been in domains where structured data is abundant, and the domains are well understood, such as weather forecasting, weather news summaries, finance, and sports."

It could also be argued that journalism has also been on the brink of a crisis for many years. Van der Haak, B., Parks, M., & Castells, M. (2012), in their article, "The Future of Journalism: Networked Journalism", stress the fact that digital improvements in the past two decades also changed the journalistic rituals and environment (p. 2923), but also focuses on the "crisis" that the journalism faces nowadays, being mainly concerned with the business models for print and broadcast journalism, rather than the potentiality of automated journalism (p. 2924). As the audience has more resources for obtaining information, the newspapers' profits have declined, alongside the advertising revenues, obligating the media companies to acquire innovative techniques to remain profitable.

Van Dalen (2012) also claims that technological developments, including automation and data-gathering tools, have assisted journalistic work over the last decades (p. 649). The automation of journalism also correlated with the recent trends in journalism, specifically, the focus on lowering the costs in journalism (p. 649).

Podolny (New York Times, 2015) names the practices of algorithms that create news as the "robo-writers" and also claims that most of the audience does not differentiate between a human writer and a robo-writer. She also indicates that these robo-writers can adapt their narrative following the needs and interests of the intended audience(s). According to her interviews with Automated Insights, the software created one billion stories in 2014, with little or no human intervention.

According to Verge's research and interview (Miller, 2015), Automated Insights' CEO indicated that their algorithm named the Wordsmith creates multiple narratives based on large data sets, using a template, focusing on keywords. Associated Press (AP), which also worked with Automated Insights, estimates that the automated news freed the journalists' time up to twenty percent, allowing them to work on other projects, local news, and investigative articles. (2017).

The industry has already adopted some features of automated copywriting:

- China-based international e-commerce company Alibaba developed AI-CopyWriter, an artificial intelligence-powered copywriting tool that works through deep learning and natural language processing (Dhandre, 2018).
- Facebook's DeepText is capable of understanding texts with deep learning (Meta, 2016).
- Microsoft has developed an AI system to generate summaries for articles (Wiggers, 2018).
- Forbes also uses an AI tool called Bertie to provide reporters with first drafts and templates for news stories (Martin, 2019).
- The Washington Post also has a robot reporting program called Heliograf which produced approximately 850 articles in its first year (Martin, 2019).
- Press Association is working with Urbs Media, which is proficient in automated content creation to support the writing processes of local news

stories. The project will be done through RADAR- Reporters and Data and Robots- built on natural language generation (NLG) technology (Marr, 2021).

- Academic publisher Springer Nature published the first research book written using machine learning (Vincent, 2019).
- Reuters developed News Tracer and Lynx, which use machine learning and artificial intelligence technologies to track news on Twitter (Google News Initiative (GNI), p. 6).
- Quartz AI Studio partnered with the International Consortium of Investigative Journalists (ICIJ) in 2019 to aid the Luanda Leaks (GNI, p. 25).
- ProPublica started using machine learning to analyze the press releases of the US Congress (GNI, p. 27).
- OpenAI's GPT-3 (Johnson, 2022) is the novelist invention in the field. As a giant supercomputer, GPT-3 can understand the language better than all its processors, including Siri and Alexa.
- The New York Times' The Upshot (Guardian, 2014) works based on data sets and visualization techniques.

Moreover, not all languages are introduced wholly to the programs. Say especially mentions the difficulties of Turkish NLP (p. 124) since Turkish is a complex language due to its agglutinative structure (p. 128). According to him, for a program to work in the Turkish language, all the words in a dictionary should be categorized according to their grammatical morphemes and later categorized syntactically (p. 129-130). Say also describes the process as such,

> *Consider tens of thousands of dimensional spaces with a different size for each word in the Turkish dictionary. We will draw a vector in this vast space for each word. The numbers that determine the vector of each word will be the number of occurrences in the same sentence as the other words that*

> *define the axes… A simple principle: two related words are more likely to occur together in the same sentences than two unrelated words.* (p. 131)[7]

Say also mentions that starting in 2016, Google Translate has been using artificial neurons, a deep learning method, to translate words and sentences rather than Statistical Phrase-Based Translation, which hugely improved the quality of Google Translate (p. 135). In other words, Say describes the translation process as,

> *What the machine does during translation can be seen as trying to find the vector in the target language's space most similar to the semantic vector in the source language.* (p. 35)

### 3.2. How Does the Public Perceive and Evaluate the Quality of Computer-Written News Articles? How Do Journalists Perceive Automation Tools? How Does Automated Journalism Change the Definitions of Journalism?

Several studies and research in this area focus on the audience's perceptions in terms of identifying the author of a particular article. In the article "The Robotic Reporter in the Czech News Agency: Automated Journalism and Augmentation in the Newsroom" (Moravec, 2020), the authors summarize research that they have conducted in which they survey selected journalists and editors in the Czech News Agency and about the use of automated journalism, and artificial intelligence journalism in the sector (p. 37). The study focuses on the production of Prague Stock Exchange reporting of the newsrooms and questions if the applications of automated journalism change their production and presentation and any editorial practices (p. 38). The authors indicate that artificial intelligence tools are currently used in several areas of journalism, such as collecting information, fact-check information, creating texts, visualizations, and graphics, and the techniques also include the use of algorithms, artificial intelligence software platforms, and natural language generation techniques (p. 38). The paper is striking because it also reflects a similar situation to the hypothesized journalistic environment in Turkey;

[7] Translated by the author from Turkish to English.

automated journalism applications are also in the early stages of development in the Czech Republic (p. 41). The author reports that there are several reasons behind this, such as the "limited number of news texts of individual thematic domains to which machine learning elements could be applied to the relatively high costs of developing creative software for which there is no money left in Czech news media's budgets (p. 41)." However, the Czech News Agency first used the technology in October 2018 to cover the municipal and Senate elections (p. 41).

The study "Intrusion of Software Robots into Journalism: The Public's and Journalists' Perceptions of News Written by Algorithms and Human Journalists" (Jaemin et al., 2017) is also significant in discussing the different perceptions of the public journalists toward automated journalism practices. The article compares the perceptions of the general public and the journalists regarding the articles written by human journalists and/or algorithms (p. 291). The result is remarkable because it has confirmed the public's negative attitude toward journalists' credibility and their need to acquire a new information technology, at least in the case of the Korean media (p. 291). To compare the perceived quality of the algorithm-written articles with the work by human journalists, both general readers and journalists are given sample questions, and several experiments are conducted. In contrast with the hypothetical expectation of the researchers, journalists also gave higher scores to an algorithm's work. Strangely, in Korea, the general consumers of the news are less favorable of the journalists' articles and more positive toward the work created by the algorithms (p. 293). Conversely, the journalists' perception tends to favor the articles told to be written by journalists, even though, in reality, the content was produced by software (p. 294). The authors indicate that it may result from the journalists' unconscious desire to protect the boundaries of their work against outsiders (p. 293).

Moreover, the first study conducted to test the qualities of automatically produced articles belongs to Christer Clerwall, who investigated how the readers perceive this content (p.294). The study led to mixed results, as the participants perceived the automated content as more "descriptive and boring." Still, it was also considered to be more compact, "informative, accurate and trustworthy (p.294)."

Indeed, there is also a need for research based on the audience and the journalists in Turkey. For Burak Doğu, currently, no distinct departments deal with data journalism in the media companies. However, some small teams are set up to work on different projects (p.183). There are some free data sets such as Datablog, Fivethirtyeight, Wonkblog (p. 183-184), Journalism++, OpenDataCity, Storyful CartoDB, Lokaler and Vizzuality, Data Catalogs, Datahub, Freebase, DDJ.it, OWNI, Graph Commons, Dağ Medya, Çilek Ağacı and Veri Gazeteciliği Platformu in Turkey.

Paul Bradshaw, who worked on *The Inverted Pyramid of Data Journalism*, states that data journalism has the steps of compiling the data, cleaning, and differentiating the data, sorting it through a context, combining it, and communicating it through a narration by visualizing, narrating, humanizing, personalizing, socializing, and utilizing, while using data as a tool (Doğu, 189).

For Carlsson and Pöyhtari (2017, p. 11-17), journalism is increasingly becoming useless even in liberal democratic countries due to censorships, propaganda, disinformation, control, and the oversight of the state, leading to the several measures of the journalists, such as hacktivism and leaks (Nayar, 2015, p.90; Çalışkan, 2016, p. 127).

Moreover, as *Media Ownership Monitor* indicates (2021),

> *Out of the top forty media outlets compiled by MOM according to their audience shares - including the ones owned by the state -, more than two thirds (eight newspapers, nine television channels, nine radio stations, and seven websites) are owned by business groups that also operate in sectors such as construction, energy, mining, and tourism: Demirören, Doğuş, Ciner, Albayrak, Kalyon, İhlas.*

In addition, for *Reporters Without Borders* (2021),

> *90% of the national media now under government control, the public has turned, during the past five years, to critical or independent media outlets of various political persuasions to learn about the impact of the economic and political crisis on the country. They include local TV channels such as*

*Fox TV, Halk TV, Tele1 and Sözcü, and international news websites such as BBC Turkish, VOA Turkish, and Deutsche Welle Turkish.*

# 4. THE FUTURE OF JOURNALISM

Van der Haak, B., Parks, M., and Castells, M. (2012), in their article, "The Future of Journalism: Networked Journalism", assert that journalism has three essential functions, namely, "1) observing the relevant facts and asking good questions to the right people, 2) understanding the observations and answers in context, and 3) explaining these findings well to others. In the global network society, these could be summarized as 1) data collection, 2) interpretation, and 3) storytelling" (p. 2925). However, they also claim that anyone who has these skills and an aim to tell stories about people can be considered a journalist, without the requirement of a media company behind the people, that "journalism is not just presenting the news (of the day or the week, of a city or even a country), but telling meaningful stories about what is new or is happening in the world, understanding it in context, explaining it to others, and making it available so others can use it (keep it, share it, remix it, and so forth) for their needs" (p. 2926). Being similar to the concept of "citizen journalism," this idea is also in correlation with the so-called "Twitter effect," leading the path to the future of journalism.

In "The Art and Science of Data-Driven Journalism" report of Tow Center for Digital Journalism (Howard, 2017), the report executives summarize that data usage is not new for journalists who have been using it for the entire existence of the profession. However, recent technologies increased the connectivity, usage, and amount of data through the invention of the internet, cloud computing, agile development, mobile devices, and open-source software (p.1). The report recommends and predicts that, as the data becomes more and more a resource for journalists, it will be also vital for them to use it strategically and in a democratic way to involve more human-robot interactions, which also indicates a rise in the need for skills such as storytelling, knowledge in social sciences, statistics, and data literacy.

According to Mark Poster in "Postmodern Virtualities", the postmodern culture will lead to the emergence of a "new individual identity or subject position" (p. 79),

which will lead to an inevitable evolution of the culture, individuals, societies, communication, journalism and for sure the work habits.

According to Pearson's study in 2017, "The Future of Skills: Employment in 2030," occupations are not in danger of eradication solely due to automation but potentially also due to other relevant trends, including globalization, population aging, urbanization, environmental sustainability, political uncertainty, increasing inequality, and the rise of the green economy (p. 7). Still, one-fifth of the workforce will probably shrink or disappear due to automation (p. 13). However, Pearson also has a solution for this potential threat; namely, redesigning and retraining the workforce could make the people adapt to new technologies and lead to human-robot collaboration. Future jobs will most probably require "interpersonal skills, cognitive skills and technological systems including fluency of ideas, active learning, originality, creativity, teaching, social perceptiveness, coordination, psychology, and anthropology, as well as the rise in importance of social skills" (p. 14).

According to the McKinsey Group Foundation research (2017), based on 46 countries, half of today's activities in the labor force could be automated by 2055, or 20 years earlier and later than predicted (p. 3). Moreover, the automation of routine activities may improve performance, productivity, and velocity and decrease the effects of human errors (p. 3), increasing productivity globally by 0.8 to 1.4 percent annually.

On the other hand, Acemoglu and Restrepo's report shows contrasting results, indicating that "between 1990 and 2007 on US labor markets, each additional robot reduced employment about seven workers" (p. 23). However, McKinsey acknowledges the previously mentioned report and remarks that the report does not "address the global effects of automation such as trade, migration and globalization" (p. 24).

B20's "Tokyo Summit Joint Recommendations" report suggests that, currently, the society is in the phase of Society 5.0, which is named a "creative society" (p.2), following the Hunting Society (1.0), the Agrarian Society (2.0), the Industrial Society (3.0), and the Information Society (4.0). The Society recommends that:

- *Governments should encourage the adoption of Internet of Things (IoT), fifth-generation mobile communication system (5G), Big Data, cloud computing, Artificial Intelligence (AI), robotics, and blockchain to increase competition and consumer welfare.*
- *Governments, business industries, and civil society in the G20 should solve economic and social challenges.* (p. 2)

The report also highlights the challenges of digitalization and automation:

- *Substantial changes in the workplace.*
- *The increase in social disparities caused by data hoarding.*
- *The potential risk of a surveillance society.*
- *A considerable loss of privacy (p.2).*
- *On the other hand, the advantages of these technologies are as such,*
- *Finding insight into data that are hard for humans to find.*
- *Automatically identifying patterns and detecting anomalies in the data.*
- *Delivering greater accuracy.*
- *Increasing operating efficiency and predicting equipment failure.*
- *Enhancing risk management.*
- *Avoiding costly unplanned downtime for several industries.*
- *Enabling new and improved products and services* (p.2-3).

The B20 also suggests G20 consider the recommendations, called B20 Tokyo Summit Seven Principles, policies, and measures should be:

- *Sustainable to achieve the SDGs*
- *Inclusive to ensure diversity*
- *Future-oriented to avoid short-sightedness in a rapidly changing world*
- *Business-driven to promote business' creativity, innovation, and entrepreneurship, regardless of their size, sector, or region*
- *Transparent to ensure accountability and integrity*
- *Rules-based to provide predictability and consistency*
- *Multilateral to solve global issues through cooperation and dialogue* (p.4).

To the World Economic Forum report, "The Future of Jobs Report," published in 2020, "technological adoption by companies will transform tasks, jobs, and skills by 2025":

> *By 2025, the time spent on current tasks at work by humans and machines will be equal. A significant share of companies also expects to make changes to locations, their value chains, and the size of their workforce due to factors beyond technology in the next five years. Although the number of jobs destroyed will be surpassed by the number of 'jobs of tomorrow' created, in contrast to previous years, job creation is slowing while job destruction accelerates. Employers expect that by 2025, increasingly redundant roles will decline from being 15.4% of the workforce to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of the company respondents.* (p. 5-6)

By 2025, 85 million jobs may be displaced, while 97 million new roles may emerge. The World Economic Forum also stresses the increase in the importance of soft skills. Moreover, COVID and the rise of remote work also accelerated white-collar jobs. In contrast, the recession also caused a deep inequality in the positions held by lower-wage workers, women, and younger workers. Therefore, the need for reskilling and upskilling are more significant than ever.

Pwc' "A Decade of Digital: Keeping pace with Transformation" report suggests the leaders focus on human experience to prepare the humans to adapt to the human-robot interaction (p.3). In 2016, for the research, 2,216 business and technology executives were surveyed, and the survey concluded that the "top performers prioritize innovation and emerging technology" (p. 5).

"Without most of us quite noticing when it happened, the web went from being a strange new curiosity to a background condition of everyday life" (Oliver Burkeman, 2019, p.1) are the opening statements of Dell's "Emerging Technologies' Impact on Society & Work in 2030: The Next Era of Human/Machine Partnerships" (2017). At a workshop by Dell Technologies and

the Institute for the Future (IFTF), participants suggested that (p. 1), "the technologies in play over the next decade have the potential to solve some of the intractable problems that humanity has faced for so long, offer the opportunity to increase productivity [such that] all our basics needs [are taken care of], and fundamentally reframe "notions of what it means to be a person." (p. 1). Moreover,

> *In Dell's Digital Transformation Index study, with 4,000 senior decision makers across the world, 45% say they are concerned about becoming obsolete in just 3-5 years, and nearly half don't know what their industry will look like in just three years' time, and 73% believe they need to be more 'digital' to succeed in the future*. (p.1)

In light of this research, Dell also begins a project with 20 experts to understand the social and technological factors that will influence the next decade between 2017 and 2027 (p.1). The report also discusses that partnership with computer programs may help humans improve and potentially transcend their physical or mental limitations (p.7). The results are as such,

- *Emerging technologies will underpin the formation of new human-machine partnerships that make the most of their respective complementary strengths.*
- *These partnerships will enhance daily activities around the coordination of resources and in-the-moment learning*
- *Expectations for work will be reset, and corporate structures will feel required to adapt to the expanding capabilities of human-machine teams.* (p. 1)

Based on McKinsey & Company Turkey's report "Future of Work: Turkey's Talent Transformation in the Digital Era" (January 2020), conducted with two hundred and fifty employees. The report suggests that "On a global scale, current technologies have the potential to help automate fifty percent of jobs. In Turkey, with the current technologies, six out of ten occupations could be automated by 30 percent" (p. 3). The report also foresees "the creation of 3.1 million net new jobs,

7.6 million jobs that could be lost, 8.9 million new jobs that could be gained due to automation systems and AI technologies implemented in Turkish industries" (p. 3). Report also argues that "for jobs lost through automation, we assessed 800 occupations and 2,000 work activities for 18 skills and identified each activity's time susceptible to automation as lost work time" (p. 4). In "Technology, jobs and the future of work", McKinsey Global Institute (May 2017) also reports the "significant potential for increased productivity growth due to automation" (p. 12). McKinsey also asserts that "one-third of the new jobs created in the United States in the past 25 years did not even exist 25 years ago," which means that the internet created "2.4 jobs for every job it destroyed" (2017, p. 13). According to the earliest scenario of automation that they predicted in 2017, "that 45 to 50 percent of working hours in Turkey could be automated by 2030" (p. 22), as long as both public and private sectors invest in technology deployment, research, and development (R&D), with high support and consensus (p. 22). If not, less than only five percent of the activities in the workforce could be automated by 2030, decreasing the competition of Turkish companies globally (p. 22). The report also suggests since labor costs are higher in the Turkish industries, automation might be a logical investment for employers (p. 22). Moreover, if they do not want to lose their jobs to automation, Turkish employees, roughly 21.1 million people, will need to improve their digital and technological skills and soft, social, and cognitive skills (p. 32).

However, for Deloitte's *From Jobs to Super Jobs* study conducted in 2019, there are certain uncertainties and fear about the future in terms of being ready for the changes in most industries (p.32). According to their survey,

> *Only 26 percent of respondents stated that their organizations were "ready or very ready" to address the impact of these technologies. In fact, only 6 percent of respondents said that their organizations were "very ready," suggesting that organizations are now beginning to understand the scale and the massive implications for job design, reskilling, and work*

*reinvention involved in integrating people and automation more extensively across the workforce.*

# 5. THE RESULTS

## 5.1. The Surveys and Interviews - Opinions of Journalists, Editors, And Fact-Checkers in Turkey

Some of the interviewees did not wish their names and/or newspapers or companies would be used in this study. Those who are allowed the use are specifically indicated. All interviews are conducted in Turkish and later translated to English by the author. Some sentences and/or answers of the journalists were reduced or cut for editorial order. Journalists were also free to answer any question that they wanted.

Some journalists argued that some Turkish media companies began using automated journalism techniques but did not describe them more. Many of them were unaware of such practice.

There is no knowledge regarding the practices; most of the interview requests were declined by the professionals because they declared that they had no previous knowledge or experience in the field. Regardless, some of them answered because no previous experience was demanded by journalists, and after the author highlighted that only their thoughts and feelings were asked for this study.

Most reporters indicated that automation programs are currently expensive, but they may cost less in the upcoming years, thus decreasing the labor cost for most companies. Most journalists also mentioned popular companies such as Automated Insights in terms of examples.

Reporters are reluctant toward the technology of automatic journalism. Most argue that automated journalism techniques cannot reflect human emotions, convey human communication, show empathy towards others, conduct field journalism, comprehend the newsworthiness of an event, follow the moral codes, or use the language as sincerely as humans do. In addition, according to them, an ideal human journalist observes, questions, researches, and archives; they are brave, transparent, conscientious, and curious, according to the opinions of the journalists. Therefore,

automated journalism does not allow a place for creativity in contrast to human journalists. For these journalists, automated journalism techniques are also inherently different from the definitions they have because, accordingly, journalism is a profession that requires dedication, reasoning, and doubt and should instill confidence in the news consumers for the work and personality of the journalist.

Also, some journalists argued that these techniques would create an environment of uniformity in which only certain news is being circulated, which is similar to the SEO-based news circulation nowadays but even more deteriorated. Moreover, it is also emphasized that since they would be created faster, in the case of being published, the risk of misinformation may rise when a human journalist does not edit the content. Still, they also agree that the programs have the potential to be faster and more unbiased compared to human journalists and have the potential to reduce the workload of the journalists.

Some journalists discussed the use of automated journalism techniques for finance, sports, and weather news writing and processing data, source controlling, deciphering, and voice recording. Moreover, a focus on more investigative journalism, niche subjects, and local news may also be increased due to the decrease in labor costs, which may help create content with detailed calculations, visualizations, and the increase in the speed of the content production.

Most journalists sincerely shared the problems they observed in the Turkish media. First of all, there are unemployed journalists in Turkey. There is explicitly a race against time in internet journalism which deteriorates the state of fact-checking. There is also a criticism of journalists who are not creative or investigative in their lines of work and rely on sharing the selected news that they acquired through the state-run or private news agencies. Also, news organizations rely on other sources for information regarding data and news shared through news agencies. At the same time, there is also difficulty in acquiring free and transparent public data in Turkey. For most journalists, there is a need for journalists to develop digital skills.

Some journalists argued that journalism has indispensable ethical codes and values. For them, journalists should be loyal to the facts and prioritize the well-

being of society and/or individuals in certain news. Also, automated journalism techniques may lead to technical and legal problems.

Some journalists focus on the consumption rates of current news, some on the rise of digital and social media, and the decrease of traditional media.

The answers of the journalists to the first question, which questions their beliefs about the use of robots and artificial intelligence programs in the future, vary in detail, but most agree that journalism is a human-based approach. Journalists also classify the act of journalism into two: the first conducting investigative narratives with a focus on human thoughts, actions, and emotions, while the latter is based on analytical details.

Starting with one sports journalist, who did not wish their name to be used in this study, from a renowned media company, thinks that automated algorithms can work as writers or editors, but since they cannot reflect human emotions the same as a reporter, algorithms are not able to create emotional pieces. The second interviewee also argues that, while the use of automated journalism is possible in theory, for collecting data, preparing literature review, and conveying the right information in a decent, impartial manner; however, it cannot be as effective as sympathizing with the audience and therefore fail to communicate, at least not as capable as human journalists. Differently, the second interviewee also argues that in terms of objectivity, artificial intelligence programs may be more capable than human journalists. The third interviewee similarly approaches the condition in terms of classifying journalism as a profession, one which is conducted as desk work and one as active, field-based work, once again arguing that automated journalism techniques are not enough for fieldwork. The third interviewee also focuses on the current costs of automated journalism programs, arguing that they will eventually decrease. And for the first time, an interviewee mentions the potential benefits of automated journalism techniques for employers and companies, which will profit from the decreased cost of human labor, the increase in the speed of news production, in addition to the potential threat of unemployment for journalists.

Generally, journalists are neither wholly for nor against the use of automated journalism techniques in their sectors. They are able to contemplate the possible

advantages and disadvantages of such use without reflecting their emotions much. Even though most believe that such use is possible not in the distant future, they also set several conditions for their future digital colleagues. The fourth interviewee, for example, believes that in the case of an algorithm producing pieces that reflect a society's ideas, beliefs, and emotions, it is certainly a possible and exciting development. But the interviewee does not reflect upon the possible effects of such practices on the current workforce.

For the first time throughout this moment in the interview process, the fifth interviewee reckons about the difficulties of teaching the techniques of news writing to such algorithms and also focuses on the impossibility of robot journalists acquiring moral codes of journalists. However, the interviewee does not highlight any details about such supposed moral codes. The interviewee also mentions the possible negative outcomes of such use, similarly to the first three interviewees. Moreover, the journalist hints that speed in news production does not necessarily guarantee quality.

The sixth interviewee discusses the “newsworthy” value of a piece of news and shares that most news is distributed by the agencies to the news corporations automatically; however, automated journalism techniques would not be capable of differentiating a piece of news in terms of its significance for the public. The journalist also believes that such systems would only be beneficial for “media moguls,” not the employees, and it would accelerate the unemployment in the journalism sector.

Up until the seventh journalist, former interviewees do not discuss the areas in which such algorithms are used. The seventh interviewee mentions that such technologies are used in finance, sports, and weather news production, similarly to what is discussed in the literature review section of this article. The journalist also mentions that such systems can learn from their mistakes in accordance with the audiences' feedback and improve their qualities, accordingly, paraphrasing the machine learning process. However, the journalist also discusses the legal problems that may occur due to such technologies, such as illegal knowledge sharing and identity revealing, since such technologies may not be taught such knowledge about

journalist ethics and law. The last journalist also mentions artificial intelligence programs such as Automated Insights and Narrative Science, also focusing, in the meantime, on the need for further development, which may span over the next five years.

Journalists discuss that such technology can be used for journalistic tasks such as data analysis, storage, editorial services, author services, and page design, especially in the news concerned about the economy, the stock market, breaking news, road conditions, and traffic, finance, sports competitions, tabloid journalism, and weather reports all of which that require quantitative data.

Some journalists also mention that such technologies can be helpful for writing articles based on Search Engine Optimization techniques created in specific patterns suitable for Google.

The eighth journalist makes a comparison between search engines and automated journalism techniques. For journalists, search engines are a significant yet underappreciated step of the research process. However, the artificial intelligence technology in journalism will bring disadvantages in addition to benefits. Different from the previous journalists, this journalist regards such practices as beneficial for investigative journalism practices with the help of data journalism techniques, speed in deciphering, and a decrease in the margin of error. However, this journalist also remarks on the possible lack of emotion and empathy in the narratives of robot journalists.

The ninth journalist draws attention to the need to define journalism and complies with one: "Journalist is a person who does this job professionally and with up-to-date information by applying the unique techniques of the profession in line with its own principles. It is to collect and process for the benefit of the public and to disseminate it in a way that attracts attention and creates impact." Since artificial intelligence is technically not human, it cannot practice journalistic ethics, which depend on humanistic ethics. As distinct from the previous journalists, this interviewee concentrates on a certain direction that these techniques may help, for example, with the decrease of labor costs, some reports and news which are currently not prepared due to lack of interest, demand, and resources may be written

with the use of automation. However, the journalist also argues that these techniques may lead to further misinformation since human intervention is a necessary step for distinguishing the facts from false reports.

The tenth journalist fervently argues in favor of traditional journalism over automated journalism because of the belief that traditional practices are healthier and more accurate, while robot journalism allows for quick and easy processing of the news. This journalist also stresses the risk that robot journalism imposes on professional journalists and the state of unemployment.

Differently, one journalist argues from a more political perspective, arguing that robot journalism may lead to biased news, especially in today's Turkey, therefore lacking the traits of an ideal journalist, being impartial, active, and observant. This journalist, similar to the others, also distinguishes the journalists into two categories, one being active on field duties and one who reports on the desk; the latter's duties may be conducted by an artificial intelligence system, as the journalist argues, but the first requires the human touch. The journalist also mentions the need for training in Turkey for the identity building of the journalists in the country.

The twelfth journalist also describes what it means to be a journalist as being able to convey, tell, show, and report an event as factual and objective as possible with linked interpretations and research. This journalist also discusses that data-based journalism is possible but has the capacity to diminish the quality and distinctiveness of the articles written by human journalists.

The next journalist is also sarcastic in that robots only lack a soul; other than that, they are identical to human journalists, especially in a journalistic environment where many publishers are not journalists.

The next interviewee, an editor, argues that the title and the text, as well as the photographs of an article, also indicate the creativity and the emotional capacity of journalists and convey the thoughts and emotions of journalists, as well as the context of the newspaper article.

A writer, documentary filmmaker, and journalist suggests that the production of robot journalism may rise depending on the demand of the news consumers, but journalism requires human conscience, especially in the field, which is a trait that

cannot be easily replaced by automation. The interviewee also discusses how the public's perceptions of news in Turkey have changed in recent years, and the practices of journalism have changed towards agency-based desk reporting rather than in-field reporting. The journalist also believes that a robot journalist cannot perform in the field as a reporter since being a reporter in an active field requires not only being a member of humankind but also being one with empathy, curiosity, and conscience.

In parallel to the first question, the second question also lingers on the use of certain applications to research or write articles with machine learning or artificial intelligence algorithms. Most journalists answered that they did not know much, while some discussed the summation programs and applications that summarize the articles such as Automated Insights, Narrative Science, United Robots, and Monok used by Forbes, Yahoo, Associated Press, Reuters, New York Times, Washington Post, and ProPublica. Some of them argue that even though artificial intelligence is currently used abroad, such technology may only become prevalent in Turkey in twenty years. One journalist also mentions the latest trend: the GPT-3 project. The same journalist also mentions trying machine learning to write an article once, which succeeded in writing not different than the one personally written by himself. Another journalist mentions an article written in The Guardian by an artificial intelligence program which also explained why people should not be afraid of artificial intelligence. A journalist from Gazete Pencere discusses a theater play written by artificial intelligence. The same journalist, however, also mentions the difficulties of accessing data sources since access to open sources is only available on the internet; hence an artificial intelligence program cannot do news research in public institutions, archives, private companies, hand transcripts, and etc.

Another journalist claims that quality over quantity and details over speed is much more significant. Therefore, even though artificial intelligence programs can collect an enormous amount of data in a short time, it is still not possible for an algorithm to write an in-detail piece of news.

For the third question, which questions how robots can help journalists do their routine work, most journalists argue that such algorithms should first blend into

society to comprehend the dynamics of the public's emotions and actions. However, they may be quite helpful in tasks such as collecting data, reviewing sources, writing the standard language of the news content directly, researching and extracting data, preparing headlines, archiving, deciphering and transcribing, and so on, especially for breaking news. It is also mentioned by another journalist that such practices may be economical for the institutions since it will decrease the number of journalists that are needed for such tasks that can be automated.

On the other hand, one journalist mentions the possible dangers of such use, one being leaked information due to hacking and certain technical problems, which can cause trouble for the institutions and people concerned about the news.

Another journalist mentions the importance of fact-checking practices for the first time throughout the interview process. The journalist describes journalism as a practice based on doubt, a feeling of distrust and argues that human journalists should check the content written by robot journalists. In addition to development of such control mechanism, the audience should also be alerted that the article that they are reading was being written by an algorithm.

Only one of the journalists argues that an algorithm can be much more successful than human journalists and eventually replace them, but only if the journalists in question are also like "robots," only being able to perform routine tasks or "copy-paste" journalism as another journalist also describes. For opinion-based articles, however, journalists discuss the shortcomings of such technologies.

The next question directed to the interviewees concerned the personality traits and the professional approaches needed for being a journalist. Journalists argue that a journalist should be a member of society, being able to comprehend the dynamics of their communities. Being attentive to the ethical principles, questioning, as well as conscientiousness, observance, and curiosity are also frequently mentioned, as well as being loyal to the truth, patient and persistent in reaching the truth regardless of their own ideologies. Only one of the journalists believes that journalists cannot be completely independent of the ideologies surrounding them and their beliefs and ideas. One journalist believes that journalistic ethics are not practiced in real life

even though they are taught at schools. Therefore, none of the institutions or the journalists are completely objective and ethical.

The interviewees also focus on the fact that journalism is a social skill that requires human interaction, being able to see the world through the eyes of others, and taking responsibility for the physical, mental, legal, and social well-being and security of others. Most journalists discuss that journalism is a challenging and demanding job. Another journalist focuses on the need for the journalists to be versatile, being able to comprehend law, politics, sociology, and world events.

An academic also stresses the need for journalists to improve themselves in areas such as computer science and technology. The interviewee also believes that journalists should be taught digital skills in order to distinguish fact and fiction online. Another journalist also argues that journalists should be in the mode of constant research and development, open to all technological and socio-cultural innovations.

A Vice President & Project Editor in an international organization concentrates on the humane approach of a human journalist by giving an example of Yaşar Kemal's interview "Fifty Days in Burning Forests," published in the 1950s, contrasting the creative style of Kemal with a supposed creation of an algorithm that may write about forest fires.

One journalist does not suggest the young pursue this profession due to the belief that journalism has lost its connections with ethical values and is highly undermined in Turkey.

Most journalists believe that articles written by automated journalism techniques will be unbiased if no human interference is observed. However, some also focus on the need for a control mechanism before publication such as editorial control. Some of them argue that, just like humans, some algorithms may be affected by corrupt data, misinformation, and manipulation.

For the journalists, the responsibility belongs to the institutions that operate the algorithms in the case of false news, misinformation, and/or data leak. Some also argue that journalists and the audience can also be held responsible for such mistakes, as well as those who set the artificial intelligence program. An academic

and journalist, however, also argues the need for novel legal legislation that analyzes the products of such technologies, especially for protecting individual privacy.

# CONCLUSION

Not enough journalists responded, possibly indicating that journalists have no particular interest or knowledge regarding the subject, as some also explicitly showed their lack of expertise in the area. For future research, on-site observation of the journalists could be helpful in terms of better understanding their daily habits and needs. Moreover, more interviews can also be conducted with an on-site observation.

Also, the potential use of automated journalism techniques should also be analyzed to differentiate fake news and comprehend the misinformation. A content analysis study can be conducted, and both journalists and the audience members may ask to distinguish between content written by human journalists or automated journalism programs.

This study is different than any other previous study on the subject because it highly focuses on the personal views of the journalists who are currently working in the industry, experiencing the deficiencies of the sector first-hand. It also does not use a hierarchy system to distinguish or classify the professionals. Instead, it encourages all to join the study; the only condition to be accepted is professional experience or academic knowledge in the industry, journalism, content management, or search engine optimization. In this sense, this study may be a pivotal step for further delving into automated journalism techniques and the future of automation in Turkey.

The expertise, experience, and know-how of thousands of journalists cannot be replaced overnight with the introduction of automation systems; that is undoubtedly a fact that needs no further discussion. However, it seems that the majority of journalists are also somewhat indifferent to the technological developments in the sector, primarily due to the lack of funds, lack of support from corporations that they are working for, and the mistrust towards the automated systems. Still, the fact that they have participated in the study indicates that they are also interested in the future of journalism and the possible automation techniques.

There is undoubtedly a need for detailed studies about the future of journalism in Turkey and the potential uses of automated journalism techniques. They can be further investigated in terms of their potential to help the journalists.

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**Appendix A: Interviewees List**

| Number | Name | Title | Company |
|---|---|---|---|
| 1 | A Sport Journalist | - | - |
| 2 | Sena Kirezçik | Strategy Planning Specialist, Screenwriter | TRT |
| 3 | Kubilay Kos | SEO Content Manager | Haberturk.com |
| 4 | Emre Özdoğan | Senior Content Editor | ShiftDelete.Net |
| 5 | Berivan Kaya | Reporter | Ege'ye Bakış Newspaper |
| 6 | İdil Janet Huvaj | Online Content Editor | Milliyet |
| 7 | Esra Çiçek | A Former Journalist | - |
| 8 | Dora Mengüç | Editor | - |
| 9 | Emre Kızılkaya | Vice President & Project Editor | The International Press Institute (IPI) & Journo |
| 10 | İrem Öztürk | Journalist and editor | - |
| 11 | A journalist | | Gazete Pencere |
| 12 | Murat Akyol | The Former Chief Editor | Antalya Aksu Newspaper |
| 13 | Muzaffer Tan | Senior AdvisorSenior Advisor | Media Watching Business |
| 14 | Songül Dalgıç Bilgili | Editor | - |
| 15 | Umut Eken | Web Content Manager | Demirören |
| 16 | Tuluhan Tekelioğlu | Writer, Documentary Filmmaker, and Journalist | - |
| 17 | Ilgaz Yalçın Fakıoğlu | Creative Content Manager | Sputnik News |
| 18 | Bilge Şenyüz | Associate Professor in Journalism | Ankara Hacı Bayram Veli University |
| 19 | Berk Göl | Sports Editor | Haber Global |
| 20 | Bekir Güneş | TV Programmer | dokuz8Haber |

| | | | |
|---|---|---|---|
| 21 | A journalist | Freelance journalist, MA student in Media Studies. | - |