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Artificial Intelligence Techniques in Media and Communication Sciences: Between Theory and Practice

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Abstract
Artificial intelligence (AI) has emerged as a revolutionary force transforming how content is produced and consumed. It possesses the capacity to process and analyze vast volumes of data, detect patterns, emulate aspects of human intelligence, and automatically generate content tailored to individual preferences. This technological capability has either reflected or actively facilitated a shift toward a new era of efficiency in media production and innovation, particularly through automating the creation of articles, reports, images, and multimedia content. AI enables the development of novel and more engaging media services, enhances existing offerings, and utilizes advanced technologies to deliver more personalized and compelling experiences to users.
Keywords: Artificial Intelligence, Media and Communication Sciences, Automation, Metaverse, Augmented Reality.

Introduction:

Artificial intelligence represents a transformative tool that has reshaped content creation and consumption. Its ability to process enormous datasets, detect patterns, emulate human cognitive abilities, and produce automated content for personalized recommendations has ushered in a new era of efficiency and innovation in media. This is especially evident in the automation of creating articles, reports, images, and video clips, while simultaneously analyzing user behavior and preferences to provide targeted content recommendations. Given the significant influence of media content on societal behaviors, AI applications have enabled media systems to surpass human limitations in speed, precision, and analytical capacity.

Innovation in media plays a vital role in enhancing communication channels and reshaping content consumption. It improves user experiences, increases access to media, elevates the quality and efficiency of services, and allows the development of more appealing formats. By integrating AI technologies, media providers can innovate and deliver experiences that are both more relevant and engaging. For instance, AI-powered algorithms can recommend content precisely tailored to users' interests and preferences, thereby enhancing overall engagement with media platforms (Fatima Al-Zahraa Bourabea & Ahmed Bousbat, p. 09).

What sets artificial intelligence apart is its widespread adoption across diverse research areas. AI is no longer confined to technology and computer science; it has expanded into the humanities, social sciences, education, medicine, and media studies. Researchers in machine

science continue to aim for advanced AI capabilities by integrating human cognitive models, enabling machines to simulate human capacities more accurately.

The concept of AI as a field of study dates back to the 1940s, coinciding with the emergence of computers and software as pioneering technologies. While an exact, universally accepted definition did not exist initially, AI was conceived as the simulation of human intelligence. The development of AI accelerated notably after a White House conference in the United States at the end of 2016, which focused on studying contemporary applications of artificial intelligence (Fatima Al-Zahraa Bourabei & Ahmed Bousbat, p. 09).

Historically, the concept can be traced back to 1950, when British mathematician Alan Turing proposed the "Turing Test" to ask a fundamental question: Can a machine think? With advances in computing technology, machines today can compete with humans in nearly all intellectual domains.

Problem of the Study:

This research addresses the understanding of AI technologies within media and examines their significant impact on the nature of content and user interaction. The study considers the implications of information inflation and the influence of AI on both technological and software-driven transformations within media institutions of the future.

Research Methodology and Theoretical Framework:

This study employs a descriptive methodology to examine AI applications in media, focusing on understanding and explaining the phenomenon rather than empirical experimentation. The research is theoretically oriented, aiming to analyze the implications of AI on media work. The study draws upon the Unified Theory of Acceptance and Use of Technology (UTAUT) and models such as the Technology Acceptance Model (TAM) to explore how individuals adopt technological innovations in media. These models also shed light on factors influencing user behavior toward AI tools, enabling easier adoption (Muhammad Al-Ghobari & Basil Yousry Abdel Fattah Othman, p. 638).

Research Objectives :

- To construct a theoretical framework explaining AI and its prospects within media and communication.
- To examine emerging AI practices in journalism and media production.
- To analyze the impact of AI systems and devices on human-machine interaction.
- To assess AI's influence on journalistic practices and workflows.

Artificial Intelligence:

American scientist Micarty Tom defined AI as "the science and engineering of creating intelligent machines and computer programs" or as a branch of computer science aimed at developing smart machines (Muhammad Al-Ghobari & Basil Yusry Abdel Fattah Othman, p. 638). AI can also be defined as "the simulation of human intelligence through computer programs capable of replicating intelligent human behaviors" (Muhammad Al-Ghobari & Basil Yusry Abdel Fattah Othman, p. 638). Mustafa Obaid described it as the agreed-upon term for

systems that simulate human cognitive abilities through programs and algorithms, allowing machines to mimic mental processes in diverse ways.

AI is closely associated with devices such as digital and electronic systems, mobile devices, and robots, which emulate human intelligence to perform tasks and self-improve based on collected data (Hala Ahmed Hosseini Metwally & Doaa Hisham Juma Farahat, p. 15). AI development has been classified into three waves:

1. **First wave (1950–1980):** Focused on computers, software, and control systems, including the earliest chess programs.
2. **Second wave (1980–2010):** Characterized by deep learning, neural networks, natural language processing, and robotics.
3. **Third wave (2011–present):** Combines aspects of the previous waves, with applications in image and voice recognition, speech-to-text conversion, healthcare, smart technologies, e-commerce, and robotics (Mohamed Al-Ghobari & Basil Yousry Abdel Fattah Othman, p. 586).

The Race to Employ AI in Media:

AI is evaluated by its ability to replicate human intelligence. Following the Turing Test, large language models emerged, including OpenAI's ChatGPT, which exemplifies generative AI tools capable of simulating human-like communication. These tools represent a significant shift in AI application, with the ability to be adapted for scientific, commercial, and creative purposes across various sectors.

AI applications in media can be categorized along three functional axes:

1. **Media content creation:** Tools such as GTA content generation techniques, natural language processing (NLP) systems, and AI platforms facilitate the creation of textual, audio, and visual content. For example, the Associated Press uses the AI platform Wordsmith to produce reports and event summaries in areas lacking human journalists. The agency reported that its productivity increased tenfold after deploying this technology.

Generative Adversarial Networks (GANs) are also used to create or modify visual content. These networks can produce artistic illustrations, generate processed images for news and articles, and even create virtual characters capable of performing broadcasting tasks.

The second axis: Applications for operational efficiency and automation

Through these applications, media organizations can use text-based commands to search their visual libraries and extract any required content. For instance, the AUYOGPT application allows users to send text commands, which the system then executes through an automated workflow. The application can manage multiple tasks, such as building a project's digital identity and website, identifying products suitable for sale through online platforms, and extracting relevant data. This automation enables journalists to streamline content creation and focus on building their articles more efficiently.

The third axis: Applications for data analysis and audience insights

Artificial intelligence enhances media outlets' ability to understand their audiences with precision. Platforms like Netflix use machine learning to recommend shows and movies based

on users' viewing history, preferences, and behavior (Asbar, *Oriental Applications Forum*, "Artificial Intelligence in Service of Saudi Media and National Issues," p. 115). Similarly, The New York Times employs an AI tool called BLOSSOM, which analyzes the outlet's articles daily, monitors social media activity, predicts which content is likely to perform well, and provides recommendations to editorial teams on what to publish.

AI's predictive capabilities are also widely applied in social media, where it forecasts trending topics to guide content coverage (Yasmina Qasi, pp. 89–90).

Impact at the media production level

Traditionally, media relies heavily on editorial work. However, with AI, processes that once complicated professional media production have been accelerated and streamlined. For example, the Chinese robot "Zuan Nan," developed by Chinese engineers, wrote a complete newspaper article consisting of 300 characters in just one second (Amina Sharif, p. 116).

Characteristics of Artificial Intelligence (*The Official Journal*, pp. 08–09)

AI is distinguished by several key characteristics, including:

- The capacity to solve problems even when information is incomplete.
- The ability to simulate human thinking processes.
- Creative potential and the ability to acquire knowledge through specific applications.
- Learning capabilities, including applying past experiences to new contexts.
- Rapid response to evolving situations.
- Providing information to support managerial and administrative decisions.

Artificial Intelligence and Media Innovation (Hossam El-Din Marzouki Awatef & Manal Azizia, pp. 12–29)

AI has driven media innovation in multiple dimensions, including product innovation, process innovation, location-based innovation, modular innovation, and social innovation. It has also facilitated the integration of new technologies such as virtual reality (VR) and augmented reality (AR) to improve media production, distribution, and consumption. AI enables the creation of new content formats such as interactive storytelling, immersive experiences, and personalized recommendations, while also supporting innovative business models, including adaptive marketing strategies designed to meet evolving audience demands.

AI has further increased media organizations' access to emerging technologies, allowing experimentation with innovative solutions to respond to audience needs. DOGRUEL (2014) summarized AI-enabled media innovation across eight key elements:

1. Media communication
2. Digitalization
3. Convergence
4. Interactivity
5. User-generated content and personalization
6. Transformation of raw data into digital information (*datafication*)

Methods of privacy intrusion via AI applications (Faris Al-Bayati, p. 353) AI-enabled web applications can be exploited through:

- **Curious users:** Hack systems as a hobby to prove technical skill.
- **Criminals:** Skilled computer specialists aiming to steal user data.
- **Snoopers:** Attempt sabotage by modifying or deleting content to achieve a goal.
- **Tinkerers:** Hack systems for amusement or experimentation.

AI tampering methods include:

- Viruses (e.g., the "Coiffis worm")
- Backdoors, which provide secret access to devices
- Spam campaigns
- Software piracy and copyright infringement
- Password theft via capture tools while online

Applications for editing and proofreading with AI

Several AI tools assist in editing and improving text quality:

1. **ProWritingAid** and **Grammarly** help edit academic texts, correct grammar, and enhance style.
2. **EmigwayEditor** allows concise editing of newspaper articles using AI-powered language tools.
3. AI applications like **LanguageTool** and **QuillBot** enable editing and proofreading across multiple languages, including Arabic, while improving clarity, style, and reducing repetition (Faris Al-Bayati, p. 234).

Table 01: Key AI Platforms and Tools in Scientific Research

Research Use	Description	Platform / Tool	Stage
Generate research questions, improve ideas, provide insights	AI platform for idea generation and text analysis	OpenAI ChatGPT	Idea generation & question formulation
Literature search, suggest research ideas based on trends	AI-powered search engine analyzing literature and generating ideas	Google Scholar Search Tools	Idea generation & question formulation
Retrieve key papers, analyze citations, provide summaries	AI tool for paper retrieval and analysis	Semantic Scholar Search Tools	Literature review
Visual mapping of related research	Platform for discovering relationships between research papers using AI	ConnectedPapers	Literature review
Reference and citation management	Tool for organizing, analyzing references	Mendeley	Literature review
Machine learning models for analyzing large datasets	Open-source ML library for complex data analysis	TensorFlow	Research methodology

Research Use	Description	Platform / Tool	Stage
Statistical analysis and predictive modeling	Tool for statistical analysis and ML for qualitative and quantitative data	IBM SPSS Modeler	Research methodology
Automated ML model design	Platform for automating ML and selecting optimal models	AutoML	Data collection
Web data extraction for market or academic research	Framework for web scraping	Scrapy	Data collection
Analyze text from surveys, comments, social media	NLP tool for unstructured text analysis	MonkeyLearn	Data collection
Analyze qualitative data from interviews and observations	Tool for qualitative data analysis	NVivo	Data analysis
Advanced analysis of images, text, and audio	Deep learning library for large-scale data processing	TensorFlow	Data analysis
Statistical analysis and mathematical modeling	Platform for statistical computation using R	RStudio	Data analysis
Interactive ML model creation with visual interface	Tool for data analysis and ML modeling	iRange	Data analysis
Enhance text clarity and rewrite sentences	AI tool for rewriting and improving text	QuillBot	Writing results & reports
Grammar and style correction	Tool for grammar checking and academic writing improvement	Grammarly	Writing results & reports
Simplify scientific texts and improve flow	Tool for improving readability and clarity	Hemingway Editor	Writing results & reports
Recommend appropriate journals for publication	Tool to identify suitable scientific journals	Elsevier Journal Finder	Scientific publishing
Suggest appropriate journals for research	Platform for journal recommendation	Springer Journal Suggester	Scientific publishing
Detect plagiarism and ensure originality	AI-based plagiarism detection	Turnitin	Scientific publishing

This table highlights the most important AI-supported platforms and tools applicable at each stage of the scientific research process.

2.3 Artificial Intelligence in Media

The primary objective of applying artificial intelligence (AI) in media is to enhance the user experience, allowing individuals to navigate platforms efficiently and access content that meets their specific needs and interests. AI also provides accurate, timely information to specialized academic and economic organizations due to its speed in data collection, article generation, output reduction, and—most importantly—lower production costs.

The features of AI development in media can be summarized as follows:

First: Big Data Analysis

AI enables the analysis of massive datasets generated by both machines and humans. This capability allows media organizations to save time and effort, improve customer service, detect fraud, and categorize users based on behavior and preferences.

Second: Cloud Computing

Cloud computing is a technology that transfers processing power and storage to remote servers accessible via the internet. This transformation converts software products into services, providing enhanced performance, reduced infrastructure and maintenance costs, and lower software expenses.

Third: Robotic Assistance

AI-powered robots assist in searching, processing, and analyzing data, supervising tasks, responding to feedback, and even writing news content.

Fourth: The Metaverse

The convergence of virtual reality (VR), augmented reality (AR), and extended reality (XR) has led to the development of the "Metaverse" project. This platform integrates seven key elements: infrastructure, 5G networks, wearable assistive devices such as VR glasses, decentralization through AI and cloud computing, 3D visualization technologies, and the creative economy, which enhances the ability to design and construct digital assets for e-commerce. It also facilitates the creation and discovery of interactive content, including digital advertising, VR experiences, games, events, marketing, and educational applications (Muhammad Al-Ghobari & Basil Yousry Abdel Fattah Othman, p. 635). The Metaverse is characterized by permanence, synchronization, accessibility, cost efficiency, and operational versatility.

Augmented Reality (AR)

AR integrates virtual information with real-world environments, primarily relying on visual perception. It overlays digital content on physical surroundings to enhance user interaction. The proliferation of smartphones and AR applications has facilitated the widespread adoption of this technology. Terms such as augmented reality, enhanced reality, and mixed reality are commonly used to describe this phenomenon (Muhammad Al-Ghobari & Basil Yousry Abdel Fattah Othman, p. 635).

Media Challenges in the AI Era

According to Yasmina Qasi (*Employing Artificial Intelligence Applications as a Driver of Media Innovation and the Extent of Its Use in Journalism*, p. 12), the main challenges facing media organizations in implementing AI include:

1. **High financial costs** for purchasing software and smart devices, which pose significant barriers to widespread adoption.
2. **Security vulnerabilities** due to the integration of Fourth Industrial Revolution technologies, which can lead to data breaches and hacking.
3. **The need for theoretical and practical training programs** to enhance production capabilities over the long term.
4. **Potential displacement of human labor** as smart robots simulate human intelligence to perform tasks and provide services.

Significance of the Study

Artificial intelligence has garnered substantial international and societal attention, especially due to its transformative role in the media industry. AI technologies have revolutionized news production and content consumption, tailoring outputs to users' preferences and interests. These tools have enhanced the quality of content production, improved investigative journalism, and ensured greater credibility of sources.

AI applications and techniques have enabled media institutions to exercise greater control over high-quality content creation. They have provided innovative solutions that enhance user experience by analyzing audience behavior and delivering the most relevant and engaging content. Consequently, AI technologies have established themselves as a critical component in media, offering improvements in service quality and user satisfaction that cannot be overlooked.

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