

Human-AI Interaction in Daily Life: Applications of Deep Learning and Machine Learning

Othman Omar Othman Alamoudi

Table of contents:

- Summary research paper's

Abstract.....	3
Introduction.....	4
Background.....	5
Problem Statement.....	6
Research Objectives.....	6
Research scope.....	7
Literature review.....	8
Critical Analysis:.....	9
Connections.....	9
Conflicts between the findings.....	10
Synthesis Matrix for Literature Review:.....	11
Gantt chart.....	16
References.....	16

Abstract

The rapid development of artificial intelligence in vital sectors of society emphasizes the urgent need: to create interaction between humans and artificial intelligence systems. This thesis will highlight several studies through which we can find ways for cooperation between humanity and artificial intelligence and how to benefit from it in our daily lives at home, work and school, etc. This research will also have a future study on how to adapt the field of artificial intelligence and benefit from it by humans and remove the concerns associated with it and how to benefit from it in the best way. We will also look at great ideas about artificial intelligence robots that are self-learning by humans and do not need any prior programming, but are taught by humans and then perform the tasks required of them in the required manner some.

In this study also we will focus in sales forecasting and industrial robotics because the limitation we are currently facing in the our work field in our company where all the calculation are made manually by human which make us facing a lot of issue like long time execution and late plan preparation and sometimes duplication or data inaccurate due to human miscalculation which it can be enhanced by benefiting from the revolution of AI which can make the work more easier and to speed up the process of the generation.

Keywords: Artificial Intelligence, Human Collaboration and AI, AI and Sales forecasting

Introduction

It is human nature to have some fears of every new experience, everything new that he sees for the first time. These fears spread with many questions in all aspects of life, not just in the field of artificial intelligence. These questions often revolve around the safety of these new technologies and whether they can one day take the place of humans in the practical and scientific field. Can these modern technologies make their own choices without consulting their owner, which generates fears in every human being of misconduct? Also, what are the ethics that these machines will adopt and can they have bad aspects such as doing something wrong? For example, self-driving cars can they choose to hit a person on the road if there is another car in front of them with a lot of people, and the result will be greater if they collide with it. Therefore, this research addresses ways of cooperation between humans and artificial intelligence and not complete reliance on artificial intelligence, which means that humans are the ethical side of managing this artificial intelligence, and artificial intelligence will be an additional assistant to humans to perform tasks that may not be possible by them or there is no time to do them by them with direct follow-up by humans.

Background

The Evolution of Artificial Intelligence

In the last few years, the discipline of artificial intelligence has seen some incredible progress. It needs to be pointed out that the field of artificial intelligence is not new. In fact, it has been there for a couple of decades. But the tremendous strides seen in the past couple of years are due to the huge amounts of open data available on the Internet, which was not readily accessible in the earlier years. This in turn, really helped the discipline to progress at a much faster rate and deliver the results that we see today, which we still do not fully comprehend.

Trust and Transparency Issues in AI

As I explained in the introduction that the human nature has difficulties in believing in the new technologies so that many rumors spread among us about those new technologies and questions that always will be faced about the new technology especially about the security of our life and data and how to make sure will be secured from thief's and hackers. And also concerns about if it will come a day that the machine with AI will replace the human in the work field specially of high and fast results that they provide.

Challenges to Enhancing Trust in AI

From my point of view the main challenge is about make the human to feel comfortable with using the AI as assistant without any doubts about it to build the trust relation between them. Also to provide easily way to maintain it and to become flexible with who will use it so it can be assisted by human to do multiple jobs depending on the filed need.

Problem statement

(HRC) has become a better solution for industrial area. Technologies such as no-code programming, virtual assistants, and intelligent sensors drive these innovations, enabling more efficiency human-robot interactions.

For the Industrial field robots often require complex programming, limiting flexibility and accessibility and in case of any issues related to programming it will need to experts to evaluate it which in usual take long time specially when there are no developers in the field .

HRC can improve productivity, reduce physical and cognitive workloads, and enrich human-robot interactions. no-code robotics can make the learning step much easier and also for any future failures much easier to fix and with merging virtual assistants make more easier for anyone to improve the machine even with zero programming knowledge. Addressing these challenges can lead to groundbreaking changes across sectors, improving both efficiency and user experiences.

No-code robotics simplifies robot programming using technologies like image and voice recognition if we adapt it with virtual assistant's by provide user-friendly interfaces which will lead to next generation of no code robotics only will need the support from the virtual assistant which will assist the human for teaching the industrial robotics.

The current solutions address specific HRC challenges, their limitations in scalability, multilingual support, and adaptability hinder their broader application. Research into innovative integrations—such as combining no-code robotics with advanced AI can lead to versatile, efficient, and inclusive HRC systems for diverse industrial and service settings.

Research objectives

- To develop and evaluate adaptable HRC systems that improve collaboration, efficiency, and user experiences across various industries.
- Design a scalable no-code robotic system that allows non-technical users to program tasks using voice and gesture recognition.
- Propose a multilingual framework for virtual assistants and chatbots to address diverse industrial requirements.
- Evaluate the integration of HRC technologies in real-world, focusing on adaptability, scalability, and user satisfaction.
- Investigate cost-effective, lightweight approaches for deploying HRC systems in different environments.

Research Scope

Key Questions:

1. What are the current AI techniques used in sales forecasting?
2. What are the main challenges faced by AI-driven sales forecasting models?
3. How can the accuracy of AI-based sales forecasts be improved?

Scope:

- **Time Frame:** The study will cover AI applications in sales forecasting from 2015 to 2024.
- **Geographical Area:** The research will focus on the retail industry.
- **Aspects Covered:** The study will examine the types of AI techniques used, the challenges faced, and potential improvements in AI-driven sales forecasting models.

Methodology:

- Literature review of existing research on AI and sales forecasting.
- Case studies of retail companies using AI for sales forecasting.

Expected Outcomes:

- A comprehensive understanding of the current state of AI in sales forecasting.
- Identification of key challenges and limitations of AI-driven sales forecasting models.
- A proposed framework for improving the accuracy and reliability of AI-based sales forecasts.

Ethical Considerations:

- Ensuring the confidentiality and privacy of interview participants.
- Adhering to ethical guidelines for conducting research.

Literature review:

No-code robotic programming for agile production study aims to create Human-Robot Collaboration (HRC) using robotics and human working together in the field of manufacturing without the need of programming expertise which will lead to the robotics can be upgraded at any time needed to do new jobs without any software development only by teaching the robot using the hardware sensors like the camera and microphone which are representing the image recognition and voice recognition by giving instructions to the robot using voice recognition and image gestures the instruction will be stored in the database so when next time there is any instructions given to the robot it will retrieve the instruction from the database and it will trigger the robot to do the request job.

Employee's perception of robots study investigates perceptions of the service employees in hospitality industry regarding the robot services. Data was collected from more than 405 employees in Amazon's Mechanical Turk (MTurk) about their opinions about the advantages and disadvantages of the robot services in their field some of the employees see it as helping to provide the best performance as a helper but the others afraid that the robotics will take their place in the work filed so they will become unemployed.

Developing human/AI interactions for chat-based customer service This paper discusses the interaction between chat-bots and humans in the field of Human-Robot Collaboration (HRC), the study has been applied in Norwegian. The study aims to increase the performance human service agents by integrating it with chat-bots services. Also, it aims to improve the interactions between the citizens and the human service agents by fast response and also by doing more than one task at the same time so the human services agents will have additional time process additional services they must do.

Hey Max, Can You Help Me? study aims to increase the performance of them employees in the industrial are using virtual assistant with low requirement for physical and mental efforts using web dashboard and natural language speaking this study has been tested with 29 users in the industrial area the system has been evaluated using system usability scale (SUS). The qualitative and quantitative results of the study showed that the users found the VR easy to use without any efforts.

Technical Methods for Social Robots in Museum article aims to study the possibility of applying the robotics in the museums to explain to the visitors of the museum about the arts there with gestures, speech recognition and interacting with them moving between them without interrupting them using sensors like cameras microphones speakers...

Increasing customer service efficiency study focuses on the Analytical Intelligence Unit (AIU) of a major Brazilian bank, which has significantly enhanced its customer service through the implementation of AI chatbots.

Why are the Sales Forecasts so low? This study has been make on bakery it aims to make the plan of the sales and food manufacturing using the algorithms of machine learning which will improve the production process and sales depend on the parameters will be used in the study like prices , promotions ...ext.

Food and beverages restaurants the study aims to provide the small business owners access to AI technologies for sales forecasting to help them to improve their sales forecasting when the owners was using the old ways to make sales forecasting for their business.

Critical Analysis:

Strengths and shortcomings are included in the research on Human-Robot Collaboration (HRC). The papers take a complete approach to study the human robot collaboration on multiple sections, to improve the performance, dedicated algorithms, and used multiple scenarios like HRC with hardware and HRC without Hardware. The research showing promising results that encourage too deep study on it. There is little discussion of incorrect information and no comparison analysis with current methods. Both the good and the negatives can be improved. From a methodological standpoint, using simulation to assess performance makes sense; nevertheless, reproducibility might benefit from additional information about certain datasets or parameters. Although the research contributes significantly to research on Human-Robot Collaboration (HRC), there is room to grow, overcome obstacles, and offer more thorough comparisons with current methods.

Connections:

1- Focus on (HRC): The HRC robotics (Human-Robot Collaboration)

frequently used in everywhere how every it has high progress in single language English but other languages have limitations.

2- Types of HRC: Several articles have discussed many different approaches of Human-Robot Collaboration with different aspects,

which demonstrating that it is a promising path.

3- Performance evaluation: The majority of research contains experimental analysis or performance evaluation

in one form or another to validate suggested solutions.

5- Lightweight solutions: Considering the high cost of the hardware equipment's, several studies

highlight the necessity for lightweight solutions

Conflicts between the findings:

- 1- **The HRC robotics (Human-Robot Collaboration):** it covers many fields of our life cycle and it covers many sides in our life side or work but all the solutions provided usually covers one side but it can be adapted to cover more aspects.
- 2- **Robotics with Embedded Software vs. No-Code Robotics:** While robotics with loaded codes performs the requested tasks, some jobs remain unfulfilled because they require learning from humans based on field needs. In contrast, no-code robotics appear more promising as they can adapt to various requirements in different aspects.
- 3- **Virtual assistant:** in the past 10 years if we asked someone or we made a survey on is it possible you will have an assistant to help you doing your work or to make sure the work is done in the correct way the answer will be **no** but the clock running so fast until we are now have the VR in our cars, mobile phones... but it still limited without giving full access to it to improve it.
- 4- **Robotics with Embedded Software vs. No-Code Robotics:** While robotics with loaded codes performs the requested tasks, some jobs remain unfulfilled because they require learning from humans based on field needs. In contrast, no-code robotics appear more promising as they can adapt to various requirements in different aspects.

Synthesis Matrix for Literature Review:

Study	Authors	Year	Research Design	Key Findings/Results	Methodology	Limitations
No-code robotic programming for agile production: A new marker-less approach for multimodal natural interaction in a human-robot collaboration context	Jayanto Halim, Paul Eichler, Sebastian Krusche, Mohamad Bdiwi and Steffen Ihlenfeldt	2022	Correlational	This study was conducted within Industrial area to fulfill their requirement to create robot machine to help the employees in the work field that robot will have the ability to learn by the employee without any needs to programming expertise.	The methodology used in the study is based on the relation between the employees and the robot in which human will teach the robot using the image recognition and voice recognition to develop the robot to enhance it to do required job.	For this study they used low-cost sensors for both voice and gesture recognition which could impact the accuracy and the reliability of the study
Employee's perception of robots and robot-induced unemployment in hospitality industry under COVID-19 pandemic	Omar Parvez, Ali Oztüren, Cihan Cobanoglu, Huseyin Arasli, Kayode K. Eluwole	2022	Quantitative	The study showed mixed feelings from the employees between the benefit of robotics and the afraid from the robotics will take their place in the work field.	The research used a survey tool with a 5-point Likert scale to study employee opinions. A pretest was conducted to ensure the validity of the survey.	The study focused on the English speaker's employees only and also the survey was applied in narrow area (Mturk) due to the pandemic of covid-19
Developing human/AI interactions for chat-based customer services:	Polyxeni Vassilakopoulou, Arve Haugb, Leif Martin Salvesen and Ilias	2023	Clinical Inquiry	This study was conducted within the framework of cooperation between universities, researchers, and the business sector to	The methodology used in the study is based on a clinical research approach, as outlined by	chat-bots uses keywords to respond so when there are complex issues it will be hard to find the

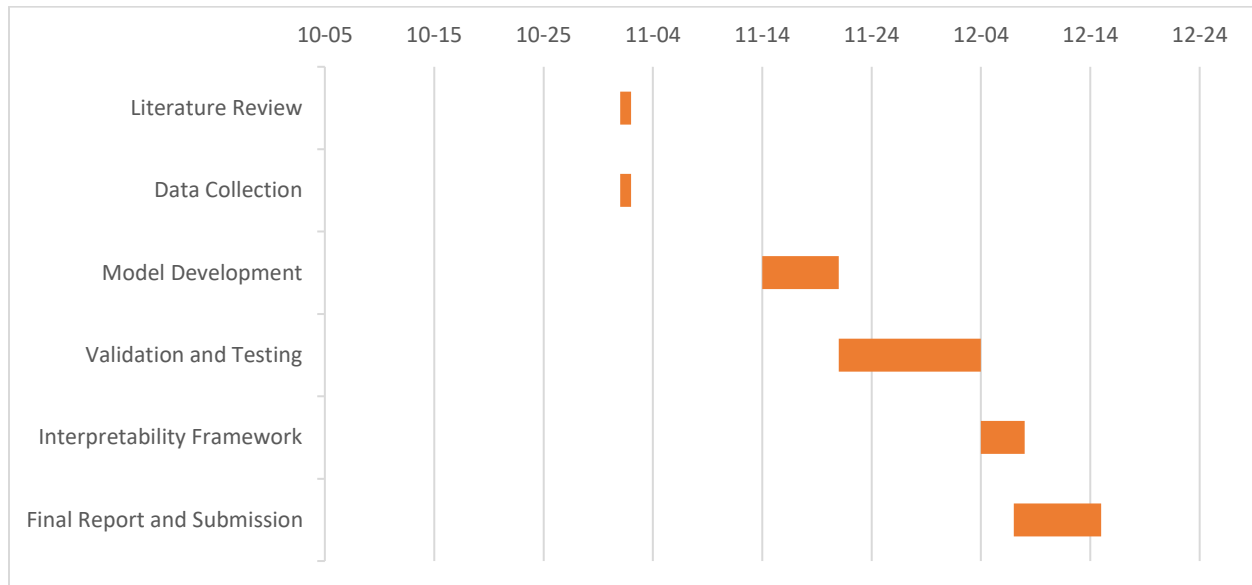
lessons learned from the Norwegian government				identify the required outputs to improve the service. Workshops were held with employees to inform them about chatbots and how these tools can enhance their jobs. As a result, satisfactory outcomes were achieved from the chatbots, including improved response speed.	Schein (1987, 2008). This approach emphasizes collaboration between researchers and practitioners to improve organizational practices.	suitable answers.
Hey Max, Can You Help Me? An Intuitive Virtual Assistant for Industrial Robots	Chen Li, Dimitrios Chrysostomou, Daniela Pinto, Andreas Kornmaaler Hansen, Simon Bøgh and Ole Madsen	2023	Mixed-methods	This study aimed to increase the performance of them employees using the virtual assistant in field of industry area	The methodology used in this study for evaluating the virtual assistant includes user study design by involving 29 users who used the virtual assistant also usability of the system was evaluated using system usability scale which provided users stratification and ease of use. The study collected both quantitative and qualitative	The study was applied in industrial area only with limitation of human resources 29 users when it was possible to implement it to wide area cause virtual assistants needed everywhere with or without robot hardware.

					data to analysis user experiences.	
Technical Methods for Social Robots in Museum Settings: An Overview of the Literature	Mehdi Hellou, JongYoon Lim, Norina Gasteiger, Minsu Jang, Ho Seok Ahn	2022	Exploratory	This study about ability to use the robotics in the public areas like museum for example using five features of robotics social navigation, perception, speech, gestures and behavior generation	The study of museum robots conducted a general and non-systematic review of literature from databases like IEEE Xplore, Springer Link, ScienceDirect , ACM Digital Library, and MIT Press Direct. The study was analyzed for prepare the requirement will be used to build museum robots like the tasks and communication skills	The limitation on this study author limited this research in the context of museums only when it is able to be applied in various environments which will limit the results and issues findings also another limitation is language when the research in single language only English when museum's visitors from various countries and had different languages.
Increasing customer service efficiency through artificial intelligence chatbot	Andrade Ivan Martins De, Tumelero Cleonir	2022	literature Review	This study aims to enhance bank customer services using analytical intelligence unit (AIU) chat-bots	Described with some exploratory aspects. This study focused in analytical intelligence unit (AIU) of a Brazilian commercial bank.	The limitation in perception has been involved in the study and the chosen unit in analyses
Why are the Sales	Fries, Marco	2024	qualitative	The study aims to improve the sales	The bakery have central	As the explanation of

Forecasts so low?' Socio-Technical Challenges of Using Machine Learning for Forecasting Sales in a Bakery	Ludwig, Thomas			forecasting and the production manufacturing food in the bakery.	factory where the food production process began and the sales process through 14 branches they owned the study was planned to cover the production area in the central factory and the branches sales forecasting.	the authors there were several limitations the application was not used for long time only used for three months which it means less data to study and also will not give accurate forecasting for annual sales also there limitation about the techniques used in the application which because the owner was not accept to continue using the machine learning system which for sure means no data to be learned on.
Forecasting Sales Profiles of Products in an Exceptional Context: COVID-19 Pandemic	Sleiman, Rita Mazyad, Ahmad Hamad, Moez Tran, Kim Phuc Thomassey, Sébastien	2022	quantitative	The study was very effective in correcting the sales forecasting and it reduced the mean square error between the real and the predicted sales	Each new item or product is learned from the historical data for the old items and products using	The limitation of this study it was being during the pandemic of corona which led to limit the study to the online

					descriptive criteria as input and the label of sales profile clusters as output. The learning process was based on 10-fold cross validation along with grid search tuning the model's parameters.	selling shops when the physical sales was not available because the lock down which led to less data to study it also the study was limited to B2C business to consumer because of the online sales
Introduction of AI-based sales forecasting : how to drive digital transformation in food and beverage outlets	Groene, Nicole Zakharov, Sergii	2024	qualitative	The study was implemented on the food and beverage restaurant in small business for owners who does not have ML for sale forecasting technology	They have implemented five step process as follows establishing clear definition of the business second identifying the relevant predictor variable third capturing the data fourth reprocessing the target and fifth identifying the model for the training validation and testing	The limitations was in the location of the restaurant that the model was applied on as the authors explained also data limitation which used in the training process

Gantt Chart



Task	Literature Review	Data Collection	Model Development	Validation and Testing	Interpretability Framework	Final Report and Submission
Start Date	01-Nov	01-Nov	14-Nov	21-Nov	04-Dec	07-Dec
Duration (Days)	1	1	7	13	4	8

References:

- [1] Halim J, Eichler P, Krusche S, Bdiwi M, Ihlenfeldt S. No-code robotic programming for agile production: A new markerless-approach for multimodal natural interaction in a human-robot collaboration context. *Front Robot AI* 2022;9:1001955. <https://doi.org/10.3389/frobt.2022.1001955>.
- [2] Parvez MO, Öztüren A, Cobanoglu C, Arasli H, Eluwale KK. Employees' perception of robots and robot-induced unemployment in hospitality industry under COVID-19 pandemic. *International Journal of Hospitality Management* 2022;107:103336. <https://doi.org/10.1016/j.ijhm.2022.103336>.
- [3] Vassilakopoulou P, Haug A, Salvesen LM, Pappas IO. Developing human/AI interactions for chat-based customer services: lessons learned from the Norwegian government. *European Journal of Information Systems* 2023;32:10–22. <https://doi.org/10.1080/0960085X.2022.2096490>.
- [4] Li C, Chrysostomou D, Pinto D, Hansen AK, Bøgh S, Madsen O. Hey Max, Can You Help Me? An Intuitive Virtual Assistant for Industrial Robots. *Applied Sciences* 2022;13:205. <https://doi.org/10.3390/app13010205>.
- [5] Hellou M, Lim J, Gasteiger N, Jang M, Ahn HS. Technical Methods for Social Robots in Museum Settings: An Overview of the Literature. *Int J of Soc Robotics* 2022;14:1767–86. <https://doi.org/10.1007/s12369-022-00904-y>.
- [6] Andrade, I.M.D. and Tumelero, C. (2022), "Increasing customer service efficiency through artificial intelligence chatbot", *Revista de Gestão*, Vol. 29 No. 3, pp. 238-251. <https://doi.org/10.1108/REGE-07-2021-0120>
- [7] Ahmadov, Y., & Helo, P. (2023). Deep learning-based approach for forecasting intermittent online sales. *Discover Artificial Intelligence*, 3(1). <https://doi.org/10.1007/s44163-023-00085-1>
- [8] Groene, N., & Zakharov, S. (2024). Introduction of AI-based sales forecasting: how to drive digital transformation in food and beverage outlets. *Discover Artificial Intelligence*, 4(1). <https://doi.org/10.1007/s44163-023-00097-x>
- [9] Sleiman, R., Mazyad, A., Hamad, M., Tran, K. P., & Thomassey, S. (2022). Forecasting Sales Profiles of Products in an Exceptional Context: COVID-19 Pandemic. *International Journal of Computational Intelligence Systems*, 15(1). <https://doi.org/10.1007/s44196-022-00161-x>
- [10] Fries, M., & Ludwig, T. (2024). 'Why are the Sales Forecasts so low?' Socio-Technical Challenges of Using Machine Learning for Forecasting Sales in a Bakery. *Computer Supported Cooperative Work: CSCW: An International Journal*, 33(2), 253–293. <https://doi.org/10.1007/s10606-022-09458-z>