2021

Artificial Intelligence CA1

N00171313

Craig Redmond (Student)

Table of Contents

[1. Introduction 2](#_Toc86406522)

[2. Applications of AI 2](#_Toc86406523)

[Advantages of AI 2](#_Toc86406524)

[Disadvantages of AI 2](#_Toc86406525)

[AI in Transport 3](#_Toc86406526)

[AI in Healthcare 3](#_Toc86406527)

[3. Recommender Systems 5](#_Toc86406528)

[3.1. Content-Based Approach 5](#_Toc86406529)

[Collaborative Approach 6](#_Toc86406530)

[4. My Recommender System 6](#_Toc86406531)

[4.1. Description 6](#_Toc86406532)

[4.2. Implementation 6](#_Toc86406533)

[References 6](#_Toc86406534)

## Introduction

Artificial intelligence (AI) is the intelligence demonstrated by machines where they simulate human behaviour or thinking, and the machines can be trained to solve problems. AI has become very popular in today’s world. AI machines are capable of learning and performing tasks similar to humans and they have the potential to have a huge impact on our quality of life.

## Applications of AI

There are numerous applications of AI today. Some of the areas include AI in Robotics, healthcare, gaming, transportation, E-Commerce, social media and marketing. Each area of application can be split into sub-sections. For example, in the internet and e-commerce AI is used to create search engines, recommendation systems, automatic translation. In transportation there are the automotive, aviation and maritime sections of AI in transport, and so on. The applications of AI that I will discuss the strengths and limitations on is AI in healthcare and AI in transport.

### Advantages of AI

* **Reduction in human Error**

If computers are programmed properly, they will not make the same mistakes that humans make from time to time. Decisions are taken from previously gathered information applying a certain set of algorithms. So, errors are then reduced and the chance of reaching accuracy with a greater degree of precision is possible (Kumar, 2019).

* **Available 24/7**

Humans are built in a way where we can work from an average of 6-9 hours a day while needing a break to refresh – this is not the case with artificial intelligence. We can make machines that can work every hour of the week without any breaks and still perform certain tasks like humans with the same, if not better efficiency (Kumar, 2019).

* **Repetitive Jobs**

Monotonous, repetitive jobs can be carried out with the help of machine intelligence. Machines can think faster than humans and can perform various tasks at the same time. Machines can carry out dangerous tasks with its parameters adjusted, which may not be possible with humans as their speed and time can’t be calculated on the basis of parameters (DataFlair, 2018).

### Disadvantages of AI

* **Unemployment**

AI has begun replacing the majority of repetitive tasks and other works with robots. Every organization would be looking to replace the minimum qualified individuals with AI robots that can do the same job or tasks with more efficiency, leading to more profitable businesses (Kumar, 2019).

* **High cost of creation**

AI comes with a high cost. The installation and maintenance costs of AI can be a huge cost to businesses. The software programs need frequent upgrades and need to adapt to the ever-changing environment. Furthermore, if there is a breakdown in the AI, the repair and replacement costs can be very high, as well as the recovery time that comes with it (DataFlair, 2018).

* **Lack of human replication**

No matter how smart a machine becomes or is programmed to be, it can never replicate a human. They are rational but very inhuman as they do not possess emotions or moral values. They do not no what is legal or ethical due to this and do not possess their own judgement making skills. They are programmed in a structured way and are told what to do and if they encounter a situation that is not familiar to them, they will perform incorrectly or break down in certain situations.

### AI in Transport

#### Strengths / Limitations

AI is a technology that can be used for predicting and detecting traffic conditions and accidents. It is used to resolve control and optimization problems. For example, autonomous trucks have been introduced all over the world in recent years. These will save costs, lower emissions, and improve road safety compared to trucks driven by human drivers. The number of accidents at night involving truck drivers is an issue and can be improved with the use of smart unmanned vehicles. This would reduce the finance costs for the drivers and the labour costs will decrease over time. The same technology is used in self-driving cars, which can allow a car to continue driving safely if the driver falls asleep at the wheel – reducing the financial costs for the drivers. AI technology can now predict and improve the outcomes of data collected by humans. This will enable transportation operators to improve their services and operations (Soffar, 2019).

AI could have a significant impact on the transport industry. Developments of AI in transportation means that autonomous trucks, cars, ships aircraft and trains might become unmanned in the future. This would result in a major concern in the job flow for taxi drivers, truck drivers and other members of the industry.

Implementation in third world countries and undeveloped regions presents many challenges. Their infrastructure is not stable enough of providing maintenance and repairs. Therefore, it would be a long time before AI can become a reality there (Anthony, 2017).

### AI in Healthcare

#### Strengths / Limitations

AI has revolutionized the healthcare industry in recent years. it has made many innovations that seemed to be impossible years ago. According to research company Gartner in 2019, they assume that 75% of healthcare organisations will have invested in AI by 2021 to improve overall performance (Omale, 2019).

Table

Description automatically generated

Figure Source - Accenture

AI in healthcare has plentiful benefits, however, also comes with some risks and challenges. For example, AI system errors could put patients at risk of injuries. The patient’s data for AI reference could put the patient at risk for privacy invasion.

One of the main benefits of this sector of AI is the accessibility it provides. In many developing countries, they do not have the standard of the world’s technological progress and their healthcare does not hold a high standard. People that are living in some of these countries can be at risk of dying since it is practically impossible to get qualified for help in time. AI innovations can be applied here to create an improved healthcare ecosystem. This sort of infrastructure can help the patients comprehend their symptoms and receive necessary treatment (Ilchenko, 2020).

AI in healthcare can increase speed and reduce costs. Thanks to AI algorithms, healthcare processes are faster and at a fraction of the original cost. From the patient’s examination and diagnosis, AI has improved the speed and efficiency of this process. For example, AI can identify the biomarkers that suggest disease in our bodies. The algorithms have significantly reduced the manual work in specifying the biomarkers, which ultimately has allowed us to save more lives by acting faster.

Despite the progress with AI in healthcare, there are some notable issues and challenges that are yet to be sorted.

One potential risk of AI in healthcare is the errors and injuries. AI systems are susceptible to errors, which could lead to patient injury or other problems. An example of this would be the AI system may recommend an incorrect medication to the patient. If eventually AI could perform radiological scans on patients, it could miss a tumour for example and lead to a defective diagnosis (Patel, 2020).

Another potential problem of AI in this area is the rise in unemployment that could occur among healthcare workers. Many activities that are carried out traditionally by humans could be done by machines. Robots and chatbots can provide mental help, analyse a patient’s condition and predict future problems for patients, as a consequence of this, many healthcare workers could lose their jobs (Ilchenko, 2020).

## Recommender Systems

Recommender systems are another section of AI that is used in a variety of areas, commonly used in in the form of product recommenders for online stores like Amazon, a playlist recommender on a music streaming service such as Spotify or content-based recommendation systems for social media platforms and content recommenders like on Netflix and TikTok. The systems analyse data from the user such as their history and behaviour. The systems take this data and can then generate recommendations to the user. There are a few types of filtering in recommender systems. Two examples are content-based and collaborative systems.

Diagram

Description automatically generated

Figure Recommendation phases. Source - <https://www.smarthint.co/wp-content/uploads/2019/01/collecting-data-1024x834.png>

### Content-Based Approach

One type of recommender systems is a content-based approach. This type of filtering is based on a user’s interactions and preference. The algorithms use the user’s history and interactions like the pages visited, time spent in specific categories on a site, the type of items that the user clicked on etc. the software is developed based on the description of the products that the user likes and then the recommendations are made based on a comparison of the user profiles and product catalogues (Schiavini, 2019). A typical example of this type of approach would be recommendations like ‘products similar to this/products you might like’. Overall, these recommendations are limited to the level of categorisation available and the amount of data the user has provided (Chua, 2019).

### Collaborative Approach

A collaborative approach is another commonly used technique in recommender systems. With this type of approach, the algorithm collects information from the interactions of many other users to derive suggestions for you. The essence of collaborative filtering is: two users who have liked the same item before will like the one in the future (Schiavini, 2019). A ‘Next Buy’ recommendation is a typical usage of this method. This type of filtering usually has a higher accuracy than content-based, however can also produce some increased variability and less interpretable results. If there is a lack of previous collected data, this type of approach can be weak (Chua, 2019).

Diagram

Description automatically generated

## My Recommender System

### Description

### Implementation

# References

Anthony, A. (2017, December). *How will AI impact the transportation industry? - PreScouter - Custom Intelligence from a Global Network of Experts*. Retrieved from PreScouter: https://www.prescouter.com/2017/12/ai-impact-transportation-industry/

Chua, R. (2019, June 26). *A simple way to explain the Recommendation Engine in AI*. Retrieved from Medium: https://medium.com/voice-tech-podcast/a-simple-way-to-explain-the-recommendation-engine-in-ai-d1a609f59d97

DataFlair. (2018, January 16). *Pros and Cons of Artificial Intelligence - A Threat or a Blessing? - DataFlair*. Retrieved from DataFlair: https://data-flair.training/blogs/artificial-intelligence-advantages-disadvantages/

Ilchenko, V. (2020, September 7). *AI Adoption in Healthcare: 10 Pros and Cons*. Retrieved from Byteant.com: https://www.byteant.com/blog/ai-adoption-in-healthcare-10-pros-and-cons/

Kumar, S. (2019, November 25). *Advantages and Disadvantages of Artificial Intelligence*. Retrieved from Medium: https://towardsdatascience.com/advantages-and-disadvantages-of-artificial-intelligence-182a5ef6588c

Omale, G. (2019, July 12). *The Need for AI Governance in Healthcare*. Retrieved from Gartner: https://www.gartner.com/smarterwithgartner/the-need-for-ai-governance-in-healthcare

Patel, U. (2020, October 22). *Artificial Intelligence in Healthcare: Advantages & Challenges*. Retrieved from Tristatetechnology.com: https://www.tristatetechnology.com/blog/artificial-intelligence-in-healthcare-top-benefits-risks-and-challenges/

Schiavini, R. (2019, January 16). *How does the AI ​​work with the recommendation system?* Retrieved from SmartHint: https://www.smarthint.co/en/ai-product-recommendation-engine/

Soffar, H. (2019, June 9). *Artificial intelligence in transportation advantages, disadvantages & applications | Science online*. Retrieved from Science online: https://www.online-sciences.com/robotics/artificial-intelligence-in-transportation-advantages-disadvantages-applications/