

MSc in Software Engineering and Database Technologies

CT621 Artificial Intelligence

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**Course:** CT621 Artificial Intelligence

**Workshop No:** Week 1

**Assignments:** Week 1

**Date of Submission:** 23/05/2021

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# Assignment 1

**Part 1:**

Write an essay (700-1000 words) on the history of AI. As well as developments discussed in the presentations and textbook, your essay should elaborate on significant events that you have identified from your own research. Ensure that all sources are fully cited following Harvard referencing guidelines.

**Part 2:**

Complete the following exercise (Exercise 8.9 in Russell & Norvig, 3rd Edition)

Consider a vocabulary with the following symbols:

*Occupation(p,o): Predicate: Person p has occupation o*

*Customer(p1, p2): Predicate: Person p1 is a customer of person p2*

*Boss(p1, p2): Predicate: Person p1 is a boss of person p2*

*Doctor, Surgeon, Lawyer, Actor: Constants denoting occupations*

*Emily, Joe: Constants denoting people*

Use these symbols to write the following assertions in Predicate Calculus:

1. Emily is either a surgeon or a lawyer
2. Joe is an actor, but he also holds another job.
3. All surgeons are doctors.
4. Joe does not have a lawyer (i.e. is not a customer of any lawyer).
5. Emily has a boss who is a lawyer.
6. There exists a lawyer all of whose customers are doctors.
7. Every surgeon has a lawyer.

## 1.1 Part 1

The idea of Artificial Intelligence is one that has existed in some way or another for over 500 years, however, when reading its history there are a few milestones which stand out in the development of computer AI.

**Bayesian Inference**

This is a branch of statistics developed by Thomas Bayes which makes use of existing information to condition the probability of another event occurring. For AI, this means allowing the computer to arrive at a decision on what to do next given all that has happened so far (Coyle 2018)).

As part of the week one discussion I referenced a BBC article about a nuclear submarine being controlled by AI (Dempsey 2021). A concern was raised about the AI’s ability to predict how other submarine captains might behave but this is something you would expect will be resolved as their Navy’s understanding improves when programming the Bayesian models.

**Boolean Algebra**

Boolean algebra, binary and logic which are one of the building blocks for modern computing and AI decision making. George Boole came up with the concept of using equations and algebra to carry out logical reasoning.

**Alan Turing**

Arguably one of the biggest imprints on the history of AI is left by the thoughts of Alan Turing.

He was behind the development of the Turing test which suggested that if a computer possesses Artificial Intelligence it should be able to respond to questions in a way that would make it indistinguishable from a human (Gillis). During the week 1 discussions, CAPTCHAS and re CAPTCHAS were discussed which are a form of Turing test designed to protect websites.

Turing was also one of the first academics to suggest that computers can be intelligent and even wrote a chess program that demonstrated a computer would be capable of playing against a human and was a pre-cursor to IBM’s chess programs such as Deep Blue.

**IBM**

The use of the term AI was first used by a team within IBM in 1955 and can be considered the starting point of modern AI. They also developed a means of machine learning based on statistics which helped them to translate language pairs and subsequently created the Deep Blue chess robot.

**AI in our daily lives**

We may not have realised it but AI was already becoming a large part of our lives as it has been used in tools such as Google Maps, email filters and of course software like *Turnitin* that is used to check our assignments for references to source material (Fagella). Even before that, functions like the auto-pilot on airplanes relied on AI.

It is perhaps software like Siri on our iPhone that has made people more widely aware of the uses of AI. Siri (and Alexa) rely on machine learning so that they improve performance over time and as this continues to improve, they will expand the number of functions offered.

We are also seeing AI being used in areas such as security and fraud analysis by banks to protect customers, or even when logging in to websites like Facebook.

**Modern AI**

The personification of where we are with AI is perhaps best illustrated by Sophia (Hanson Robotics), a robot that has the ability to engage in conversation, recognise faces, make eye contact and interact as people would. Sophia (or other similar social robots like her) may fill a role in jobs such as providing assistance to sick or elderly either by connecting them to health care or simply by being social with them (Kelly 2021).

The creation (and success so far) of Sophia has also brought about another topic raised as part of this week’s discussions, namely the replacement of workers with machines due to AI. The moral and ethical dilemmas which arise between businesses and social justice as a result of AI are unfortunately likely to be the dominant topic of discussion before we all see a Sophia in our own home.

## 1.2 Part 2

I have used the symbols provided on slide 8 of Workshop 1 Section 2 – Propositional Logic and Predicate Calculus

1. Emily is either a surgeon or a lawyer

Surgeon(emily) ∨ Lawyer(emily)

1. Joe is an actor, but he also holds another job.

Actor(joe) ∧ Doctor(joe) ∨ Surgeon(joe) ∨ Lawyer(joe)

1. All surgeons are doctors.

Surgeon ∀ Doctor

1. Joe does not have a lawyer (i.e. is not a customer of any lawyer).

∃ Y Lawyer (y) ¬ Customer(joe, y)

1. Emily has a boss who is a lawyer.

∃ Y Lawyer (y) ∧ Manager(emily, y)

1. There exists a lawyer all of whose customers are doctors.

∃ Y Lawyer (y) ∀ Customer(doctor, y)

1. Every surgeon has a lawyer.

∃ Y Lawyer (y) ∧ Customer(surgeon, y)

**Appendix 1**

**Assignment 1**

**References**

Press G (2015) A Very Short History Of Artificial Intelligence (AI)

Available at: <https://www.forbes.com/sites/gilpress/2016/12/30/a-very-short-history-of-artificial-intelligence-ai/?sh=6da2e0866fba>

Accessed 22nd May 2021

Anyoha R (2017) The History of Artificial Intelligence

Available at: <https://sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/>

Accessed 22nd May 2021

javaTpoint (undated) Bayes' theorem in Artificial intelligence

Available at: <https://www.javatpoint.com/bayes-theorem-in-artifical-intelligence>

Accessed 22nd May 2021

Chisling A (2017) The history of AI is a neural network of the greatest thoughts and minds of humankind

Available at: <https://blog.rossintelligence.com/post/history-artificial-intelligence>

Accessed 22nd May 2021

Coyle P (2018) What is Bayesian Statistics used for?

Available at: <https://towardsdatascience.com/what-is-bayesian-statistics-used-for-37b91c2c257c>

Accessed 22nd May 2021

Gillis A (undated) Turing Test

Available at: <https://searchenterpriseai.techtarget.com/definition/Turing-test>

Accessed 22nd May 2021

Dempsey M (2021) The Navy sub commanded by artificial intelligence

Available at: <https://www.bbc.com/news/business-56993035>

Accessed 22nd May 2021

Steadman I (2017) Remembering Alan Turing: from codebreaking to AI, Turing made the world what it is today

Available at: <https://www.wired.co.uk/article/turing-contributions>

Accessed 22nd May 2021

Hanson Robotics (undated) Sophia

Available at: <https://www.hansonrobotics.com/sophia/>

Accessed 22nd May 2021

Kelly J (2021) Sophia—The Humanoid Robot—Will Be Rolled Out This Year Potentially Replacing Workers

Available at: <https://www.forbes.com/sites/jackkelly/2021/01/26/sophia-the-humanoid-robot-will-be-rolled-out-this-year-potentially-replacing-workers/?sh=65c796836df2>

Accessed 22nd May 2021

Fagella D (2020) Everyday Examples of Artificial Intelligence and Machine Learning

Available at: <https://emerj.com/ai-sector-overviews/everyday-examples-of-ai/>

22nd May 2021