Southampton Data Science Academy

LLOYD'S

Fundamentals of AI for Business

Course Syllabus and Learning Outcomes

2020

Lloyd's Courses

Southampton Data Science Academy

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Course Overview

Fundamentals of AI for Business

Duration: 8 weeks

Number of hours: 40 (includes tutorial support plus self-study, assignments and peer discussions)

Assignments: Four assignments (each worth 25% of the final mark)

This is a course about one of the most talked about technologies today: Artificial Intelligence (AI). AI has delivered some of the most amazing technical advances of the last decade, outperforming human abilities in domains as diverse as image recognition, natural language understanding, pattern detection, prediction and autonomous devices. It has shown it can transform entire industries over the course of a few years, and change the way we think about our lives, jobs, businesses, government and society.

The course comprises eight modules each of one week duration.

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Course Structure

Week 1

In the first week you will meet your tutor and other participants, find out more about the topics you will cover during the course and how we will be supporting you. Topics introduced in the first week include how the impact of user expectations and advances in computing technology contributed to a history of AI 'winters' and 'summers', the core technologies associated with AI and the types of data these technologies use. The contributions of 'big data', 'cloud computing' and the 'internet of things' are discussed, along with possible legal, moral and ethical implications which may have arisen.

Week 2

Through a case study of customer review analysis, the machine learning approach of natural language processing (NLP) is examined. Often considered to be the foundation of modern AI, the process of machine learning is investigated through the use of NLP to help bridge the gap between human communication and machine data. Treating machine learning as a 'black box', the focus of this week is for you to understand the NLP tasks machine learning can solve, become familiar with existing machine learning tools, and be able to decide whether the results produced by different machine learning processes will meet the needs of your organisation. In the discussion forums for this week you will be asked to consider how the use of NLP could be implemented within your organisation.

Week 3 & 4

With a focus on conversational agents and chatbots, the case study for the third week investigates tools which enable machines to 'understand' text. The ability to carry on a conversation is at the core of the 'Turing test', which for many years has been the ultimate means by which to decide whether a machine or computer programme can be considered intelligent. In considering machine understanding, the relatively recent emergence of 'deep learning' (as a sub-field of machine learning driven by availability of large volumes of data and developing computational infrastructures), is compared with 'older' rule based system approaches. Based upon this comparison, you will develop an awareness of the appropriateness of different AI solutions for your organisation. As with the first case study, you will be asked to contribute your thoughts to a discussion forum regarding the appropriateness of implementing a deep learning or rule based AI approach within your organisation.

Week 5 & 6

Introducing use of search, clustering and knowledge graph processes, the case study in Week 5 and 6 introduces in further detail the concepts of supervised and unsupervised learning, to identify patterns that exist in data without classification labels. Such methods are used extensively by searching algorithms as they enable clustering of similar or closely-related results. By the end of these weeks, you will have gained an understanding of the means by which today's search engines provide results, and how they leverage structured information from knowledge bases to enhance both performance and user experience. In the discussion forum you will be asked to consider how these processes may be used within your organisation, for purposes other than 'standard' web searches.

Week 7

In the seventh week, the impact of deep learning is examined through an AI case study of supervised techniques in which image classification with near human accuracy is performed by machines. Based upon NLP oriented deep learning architectures, coupled with convolutional neural networks, examples of the ability of machines to generate sensible textual descriptions of images and video are examined. As with previous case studies, you will be asked to contribute your thoughts on possible implementation of this AI process within your organisation.

Week 8

In a very short period, AI has evolved into an essential part (e.g. personal assistants, news and content recommendation) of our daily lives. Nowadays, it is able to defeat professional gamers in chess, Go and video games. The potential benefits from AI can be tremendous. However, recent incidents of malicious use of AI has exposed important technical and ethical challenges that should be addressed in order for us, as a society, to minimise the side effects associated with the wide adoption of these technologies. In the final week of the course, we seek to recognise the importance of establishing those ethical frameworks that will allow us to experience the benefits from AI, while our values, such as privacy, democracy, justice and safety, are respected.

Aims and Learning Outcomes

This course aims to provide you with the knowledge and experience to identify opportunities for proposal of deployment of AI solutions to real business needs.

Having successfully completed the course modules, you will be able to:

- Describe AI and the role it can play to deliver benefits for your organisation
- Identify potential applications of AI in practice
- Assess the main capabilities of AI and the core technologies that help deliver them
- Distinguish between different types of data used in AI and their characteristics and uses
- Explain the fundamental concepts of extraction, clustering, prediction, as well as search and planning techniques
- Advise on how software can be used to process, analyse, and extract meaning from natural language, images and numerical data to understand the world the way we do
- Identify the different components required to deliver complex AI systems, such as autonomous cars or intelligent assistants
- Explain the ethical implications of AI in different areas of the economy, government and society

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Modules and Topics

Module 1: Introduction – What is Artificial Intelligence?

TOPICS

- Introduction to AI
- 'Winters' and 'summers' of AI
- Machine learning
- Deep learning
- Supervised vs unsupervised learning
- Business challenges and opportunities to deployment of AI
- Deployment of AI solutions within your organisation

LEARNING OUTCOMES

- Present an overview of artificial intelligence
- Explain the relationship of AI to other disciplines including statistics and computer science
- Summarise concepts of AI and the different forms it can currently take
- Reflect on what counts as artificial intelligence
- Summarise aspects of AI which may impact upon a decision to deploy AI within your organisation

Module 2: Learning to Know Your Customers Through NLP

TOPICS

- Introduction to natural language processing (NLP)
- The NLP pipeline
- From text to data
- Applications of NLP
- Overfitting
- Evaluation metrics
- Decision trees
- Case study: support vector machines
- BOW
- TD-IDF
- High dimensionality
- Linear classifiers
- Business challenges and opportunities to deployment of NLP
- Opportunities for deployment of NLP within your organisation

LEARNING OUTCOMES

- Present an overview of the NLP tasks which machine learning can solve
- Explain existing machine learning tools used within the field of NLP
- Summarise whether the results produced by different machine learning processes will meet the needs of your organisation
- Reflect upon how the use of NLP could be implemented within your organisation

Module 3: Enhancing the Customer Experience Through NLG

TOPICS

- Introduction to natural language generation (NLG)
- Turing test
- Difficulties in applying NLG
- Application of NLG
- Knowledge structures and rules
- Rules vs learning
- Concept maps – web of data
- Templates
- Case study: Structured data and rules / templates
- Business challenges and opportunities for deployment of NLG
- Opportunities for deployment of NLG within your organisation

LEARNING OUTCOMES

- Present an overview of the NLG tasks which machine learning can solve
- Explain existing machine learning tools used within the field of NLG
- Summarise whether the results produced by different machine learning processes will meet the needs of your organisation
- Reflect upon how the use of NLG could be implemented within your organisation

Module 4: Search and Data Mining

TOPICS

- Introduction to search and recommendation systems
- Internet search, page rank, knowledge graph
- Ethical implications and responsibilities
- Applications of data mining
- Personalisation
- Micro-segmentation
- Unsupervised learning
- Evaluation metrics
- Case study: K-means clustering
- Customer database
- Business challenges and opportunities for deployment of data mining
- Opportunities for deployment of data mining within your organisation

LEARNING OUTCOMES

- Present an overview of search and data mining as AI processes
- Explain existing machine learning tools within the fields of Search and Data Mining
- Summarise whether the results produced by different machine learning processes will meet the needs of your organisation
- Reflect upon how search and data mining could be implemented within your organisation

Module 5: Computer Vision

TOPICS

- Introduction to computer vision
- When machines see
- Key approaches
- Ethical implications and responsibilities
- Applications of computer vision
- Facial recognition
- Driverless cars
- Medical imaging
- Game playing
- Case study: Reinforcement learning
- Vertical driving game
- Business challenges and opportunities for deployment of computer vision
- Opportunities for deployment of computer vision within your organisation

LEARNING OUTCOMES

- Present an overview of computer vision as AI processes
- Explain existing machine learning tools within the AI area of computer vision
- Summarise whether the results produced by different machine learning processes will meet the needs of your organisation
- Reflect upon how computer vision could be implemented within your organisation

Module 6: AI in your Organisation and Future Directions

TOPICS

- Selecting a process
- Matching problems to solutions
- Choosing an algorithm for a given problem
- Introducing AI into your organisation
- Augmentation vs automation
- Current status
- Business strategy
- Organisation position within AI capability model
- AI heat map
- AI canvas
- New contexts for AI
- Mixed reality
- IoT
- Big data
- AI as a service
- New opportunities or hype?
- Cost benefit of deep learning
- Ethics of AI deployment
- Ethical framework in place within your organisation
- Deployment of an AI solution within your organisation

LEARNING OUTCOMES

- Produce a structured proposal for the deployment of AI in an organisation
- Apply ethical frameworks for the deployment of AI in an organisation

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If you have any questions about this course or the other courses available for Lloyd's marketplace professionals, call **+44 (0)12 2344 7775** to speak to a member of our team.

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