



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT



ARTIFICIAL INTELLIGENCE (AI) MASTER CLASS for BUSINESS EXECUTIVES 2017

(4-day short learning course)



Compiled by ITSI
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“Every single Business Application is going to be disrupted by AI.”

- Harry Shum, Executive Vice President of Microsoft's Artificial Intelligence (AI) and Research group.

“In the future AI will be diffused into every aspect of the economy.”

- Nils J. Nilsson, Professor of Engineering in Computer Science, Stanford University

“We will build our next Industrial revolution on Artificial Intelligence, "smart" energy technology, robotics, and 5G wireless.”

- Theresa May: Prime Minister: UK.

“Machine Learning is the next Internet”

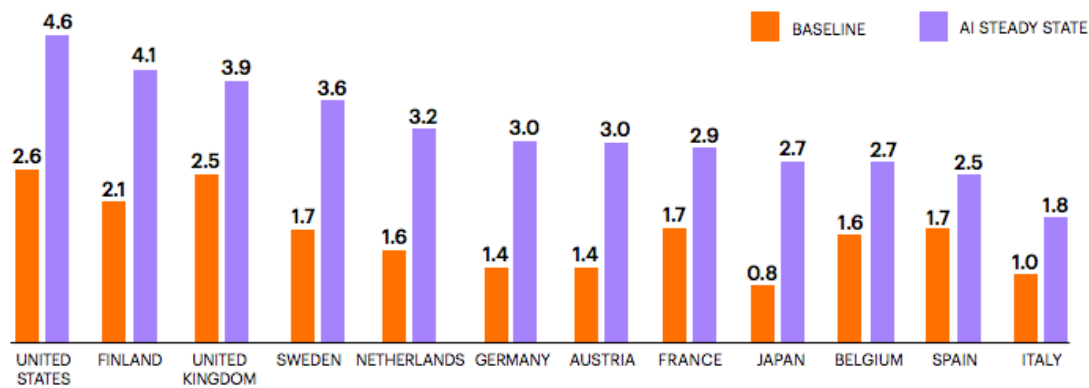
- Tony Tether, Director: DARPA
(DARPA is seen as the crucible of the Internet).

“The advance of AI is leading us to rethink fundamental economic relationships and how value is created.”

- David Lehrer, CEO : Conatix

Introduction: Why AI?

It is clear that Artificial Intelligence (AI) and Machine Learning (ML) will have a profound impact on almost all companies in years to come. The proliferation of Big Data, IoT and smartphones, and the ease of integration into open AI Learning Engines, have taken Machine Intelligence out of the domain of academia and made it one of the largest business opportunities for the foreseeable future. The impact of AI will be vast and profound and it will be felt across the entire value chain.



Real gross value added (GVA) (% growth)

Figure 1: Difference between economic growth rates in largest economies by 2035, with and without AI. (Source: Accenture white paper: AI is the future of economic growth, 2016).

Some AI implementations will be done in a matter of hours, as off-the-shelf AI solutions are plugged into existing data sets to assist in fraud detection and automated report writing.

Other AI solutions will be implemented in a matter of weeks as easy-to-use interfaces offered by companies such as Amazon and Microsoft Azure, allowing you to choose and manipulate various algorithms with the click of a mouse.

In other cases, AI will be part of an entire overhaul of an organisation's Digital strategy. This implies a strategy where IoT, app driven data acquisition, Big Data storage, integration into other open API's and Graphs, and Machine Learning are integrated to create an entire new data-centred ecosystem.

Whatever the journey a company embarks upon, it is critical that all executives within a company should be exposed to the foundations behind AI and be exposed to the future business impact.

The AI Master Class short learning course has been created to;

empower all executives to be able to make informed decisions about the benefits of AI within all areas of their organisations, and to be able to understand the strategic implications of AI within a new digital ecosystem.

OUTCOMES OF THIS COURSE

The course incorporates detailed discussions around the hot topics of AI and ML and includes the following:

- Market need analysis.
- Speech Recognition.
- Virtual Agents.
- Machine Learning Platforms.
- AI-optimised Hardware.
- Decision Management.
- Deep Learning Platforms.
- Biometrics.
- Robotic Process Automation.
- Text Analytics and Natural Language Processing.

It further provides an overall context and History of AI and ML, a taxonomy of mathematical techniques and important information where AI or ML techniques are applicable or not. It empowers Business Executives to understand the foundation elements of AI and allows them to lead their activities and personnel with a higher degree of authority.

The course will furthermore **demystify AI and ML** and show that the Mathematics behind it is quite trivial. The key to success behind AI is the data. The course will also focus on the Digital Transformation journey that will enable Executives to create a data rich environment in which AI can thrive.

The course is **practical**, as it allows the participants to get their hands dirty in using their own data to look for useful patterns, using a variety of algorithms available within the Machine Learning domain.

In short, this course allows Executives to:

- see through the mist and allow them to use Machine Learning to make better **sense** of the world around them;
- be able to **comprehend** it in radical new ways; and
- allows them to **act and react** far quicker than before.

It finally allows them to **create strategies and procedures** in which AI can be used to make a meaningful difference to the organisation's top and bottom line.

What attendees will get out of this course

The key to this AI course is a balance between a **deeper insight into AI**, combined with a **practical approach** that allows for immediate use of AI to the benefit of the organisation. This entails the following:

- A comprehensive framework to understand the foundations underlying AI and ML.
- An overview of the interlinked nature of AI, Data Analytics, Perceptual Understanding, Machine Learning, Deep Learning and Convolution Neural Networks.
- A practical, case study driven overview of the various types of learning, training and model approaches used in AI.
- A managerial understanding of Supervised, Unsupervised and Reinforcement Learning, as well as the skill-set, data sets and operational requirements linked to each of these learning approaches.
- An insight into the impact AI will have on various areas within the value chain.
- An understanding of the key API and software tools and the pros and cons of each one.
- A comprehensive overview of technological developments in the AI sector.
- An effective management framework to create a comprehensive Digital Strategy to encapsulate all the elements within the new Digital Value chain to optimise your AI investment.

Who should attend and why?

The short learning course is designed for:

- Executives who would like to obtain a deeper understanding of the contemporary Digital and AI landscapes and who want to increase their Strategic insight into the field of Digital Transformation.
- Managers who would like to make their current processes more efficient without having to dig too deep into the technology.
- Innovation and R&D executives who want to use AI to obtain a competitive advantage over their competitors.
- Strategy Officers who would like to understand the implications of a transformative Digital Strategy with AI at its core.
- IT Executives and HR Managers who require an understanding of the skill-set change needed to harness new AI opportunities.
- Marketing Managers who want to map the personality profiles of their target market via Big Data and AI, and create custom fit digital advertising campaigns to target Markets-of-One.

- Sales Managers and Executives who would like to know how AI can provide them with better information on Sales leads.
- Risk officers who would like to understand how AI can significantly reduce risk and fraud within an organisation.

The training organiser

The Institute for Technology Strategy and Innovation (ITSI), aligned with the School of Business and Governance at North-West University (NWU), has been conducting post-graduate training to the Telecommunication, Financial and ICT sectors for the past 13 years. It graduated more than 3 000 students and delivered more than 100 innovation projects in the past decade. It developed 10 post-graduate University accredited training programmes in the Telecommunication, Finance and ICT sector since 2004.

COURSE SILLABUS

DAY 1 – AI: HISTORY and TAXONOMY OF AI

Session 1: AI Balderdash - An introduction to Artificial Intelligence (AI) and Machine Learning (ML) terminology

The terminology used in the field of AI and ML is often far removed from the language used by managers and executives on a daily basis. The terminology is however key in understanding the field of Machine Learning and Artificial Intelligence. The first module in this course is therefore aimed at getting everyone on the same page.

A light hearted game called *AI Balderdash* has been created to ensure that everyone understands the definitions, constructs and terminology used during this course. In addition to ML terminology, Social Science theory will also be discussed. Terminology such as attractors, edges, behavioural algorithms, vectors, graphs, clustering and all the other weird and wonderful terms used in the world of AI, ML and Social Science will form the core of the discussion.

Outcomes:

After completion of this session, you should be able to:

- Define the most common terms used in the field of AI and ML.
- Discuss the Social Sciences terminology that supports the field of AI and ML.
- Explain how these terms link the world of business, human behaviour and mathematical modelling.

Session 2: The History of AI and ML



The terms AI and ML have become much more widespread than ever before. They are often used interchangeably and promise all sorts of applications from smarter home appliances to robots taking our jobs.

But while AI and ML are strongly related, they are not quite the same thing. AI is a branch of computer science *attempting to build machines capable of intelligent behaviour*, while Stanford University defines machine learning (ML) as *“the science of getting computers to act without being explicitly programmed”*.

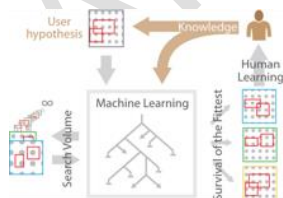
You need AI researchers to build the smart machines, but you need ML experts to make them truly intelligent. There is an ongoing pursuit to automate most of the tasks performed by humans in an intelligent way. Finding the most appropriate intersection of intelligent machine automation and human intelligence, poses some critical questions. This session provides a thorough overview of the history of AI and ML.

Outcomes:

After completion of this section, you should be able to:

- Discuss the history highlights of AI and ML in relation to how you can apply the concepts today.
- Identify the foundational theories upon which AI and ML have been built.
- Divide the fragmentation of the AI field into various sub-disciplines including ML.
- Exhibit the different uses of machine intelligence in the form of AI and ML.
- Extrapolate historical AI and ML trends to define future possibilities.
- Evaluate how we apply all these approaches across our private life and that of organisations.

Session 3: The difference between Human Learning (HL) and ML



The most valuable resource we have in the universe is intelligence, which is simply information and computation. However, in order to be effective, technological intelligence has to be communicated in a way that helps humans take advantage of the knowledge gained.

HL is the act of morphing, modifying, acquiring and reinforcing new and existing knowledge, behaviours, skills, values, or preferences which may lead to a potential change in attitude or behaviour relative to the type and range of experience, and how we synthesise it.

In contrast, ML at its most basic is the practice of using algorithms to use and analyse data, learn from it, then highlight patterns, and make a determination or prediction about something in the real world. The machine is “trained” using large amounts of data and algorithms that give it the ability to learn how to perform the task.

One of the most important departure points in the AI and ML journey, is to develop a deeper understanding of the difference between HL and ML. This understanding is one of the most important foundations of this course, as it highlights the differences of the outcomes of each approach. It also allows us to understand the limitations of each approach and allows us to optimise our endeavours in order to obtain the optimal value of each approach. In the end, it is the synergy that will be created in the joint understanding of the outcomes of HL and ML that will lead to the overall success of AI in the workplace.

Outcomes:

After completion of this section, you should be able to:

- Explain the foundational elements of Human Learning.
- Explain the foundational elements of Machine Learning.
- Identify the foundational differences between Human and Machine Learning.
- Explain the optimal way to combine Human and Machine Learning.

Session 4: Assessing the difference between supervised and unsupervised Machine Learning

In this section, you will be introduced to the three main AI and ML categories under which algorithms are classified. The three main ML Algorithms categories are:

- **Supervised** ML Algorithms make predictions on a given set of data samples. Supervised ML algorithm searches for patterns within assigned labels associated with the data points.
- **Unsupervised** ML Algorithms work on the basis that patterns can be discovered without using labels, as opposed to looking for patterns within labelled data. These ML algorithms organise the data into a group of clusters to describe the structure of the data. This allows complex data to appear simple, and allows for its organisation to facilitate further analysis.
- **Reinforcement** ML Algorithms are best described from examples in evolutionary biology. It is very similar to the evolutionary characteristics of an organism that undergoes mutation. If a mutation performs better than the original, it replaces it, until the most optimal mutation remains for the

environment it competes in. The abundance of processing power allows multiple mutations of an algorithm to occur. This process leads to the emergence of the most effective algorithm in a specific environment or fitness landscape. In data analysis terms, these algorithms choose an action, based on each data point and later determine how good the decision was. Over time, the algorithm changes its strategy to learn better and achieve the best result. (Source: www.astro.caltech.edu/~george/aybi199/Donalek_Classif.pdf)

Outcomes:

After completion of this section, you should be able to:

- Identify in which category a specific ML algorithm will fall.
- Explain the advantages and disadvantages of each approach.
- Create a data acquisition strategy based on each type of algorithm.
- Devise a Human Resources requirement for each type of algorithm.
- Create a software and hardware strategy to support each of these ML algorithms approaches.

Session 5: AI created User Behaviour Mapping vs. Narrative Enquiry

Narrative inquiry is a way of understanding and inquiring into experience through “collaboration between researcher and participants, over time, in a place or series of places and in social interaction with milieu”.

Narrative analysis therefore can be used to acquire a deeper understanding of the ways in which a few individuals organise and derive meaning from events. It can be particularly useful for studying the impact of social structures on an individual and how that relates to identity, intimate relationships and family. Narrative Enquiry can also be used to allow new behaviour patterns to emerge as new coherences between artefacts and archetypes within markets are mapped.

In this session, we will highlight the differences between ML and Narrative Enquiry. We will also discuss which type of sensemaking techniques can be used in both examples and how this can be used to deepen your understanding of the market.

Outcomes:

After completion of this section, you should be able to:

- Assess the various methodologies used in micro narrative enquiry.
- Discuss the creation of emerging archetypes when using dual-stage narrative circles.
- Explain the similarities and differences of the insights that can be obtained from Narrative Enquiry and ML gathered market insights.

- Debrief the types of insights that can be obtained when you combine the insights from Narrative Enquiry and ML created Market Need categorisations.

DAY 2 – AI: BUILDING THE PLATFORM

Session 1: Digital Transformation and the Future of AI

Digital transformation refers to the transformation of business processes, strategies, competences and business models to optimally leverage the opportunities enabled by digital technologies. Digital Transformation can be applied across the value chain of an industry, as well as within organisations.

Digital Transformation is normally applied in the following context:

- a) Use Digital Transformation strategies and techniques to create more efficient processes.
- b) Use Digital Transformation to deepen customer insight and provide a better customer service.
- c) Use Digital Transformation to create new revenue streams.

In this section we will take a look at the impact that AI has on Digital Transformation and how organisations can use bespoke or off-the-shelf AI tools to have an immediate impact on the efficiency and effectiveness of the organisation.

Outcomes:

After completion of this section, you should be able to:

- Compare the impact of AI on insurance, banking, telcos, logistics and customer service.
- Explain the impact of Digital Ecosystems on AI, and vice-versa.
- Assess how contemporary Digital Ecosystems will allow a new kind of AI to emerge.
- Discuss how you can use AI to make internal processes more efficient.
- Explain how you can use AI to obtain deeper market insights.
- Identify possible new revenue opportunities that are being made possible by AI.

Session 2: ML and AI-generated User Behaviour Mapping vs. Traditional Market Research

Market Research is traditionally conducted to obtain deeper insight into the true state of the market and the emotions and perspectives the agents within the market have of a company and its products. A serious limitation of traditional research is the categorisation of market segments that are done before the data is gathered. In a number of instances, research is done to see how effective mapping of data is done onto pre-existing categories. Another limitation is that people are not rational decision makers, although rational decisions are often communicated via market questionnaires.

ML can be used to obtain far better insight into markets, as it looks at actions, rather than opinions. ML can be fed raw data without any pre-constructed categorisations. ML engines can construct far more

applicable categorisations from the data it has been fed. The key to success will however be the sources of data, rather than simply the algorithms used. ML will provide far richer insight into market dynamics, as it is not restricted by outdated categorisations that do not effectively map individual's needs.

The combination of three fields of technological innovation is making this advancement possible. Dynamic access to storage and on-demand computational processing power is allowing for widespread implementation of concepts previously only available in large and expensive laboratories.

This session will look at the advantages and disadvantages of both approaches. It will provide the participants with invaluable insight into the limitations of existing market research techniques and the huge advantages of identifying new patterns of behaviour made visible via the power of ML.

Outcomes:

After completion of this section, you should be able to:

- Discuss the methodology used in making sense of traditional market research.
- Identify the main differences between AI-created User Behaviour Mapping vs. Traditional Market Research.
- Explain how you can obtain the relevant data to enable ML engines to map new behaviour patterns within the market.
- Explain why Machine Learning will provide new categorisations of markets based on behavioural patterns.

Session 3: Case Study: AI, Graphs, Open APIs and Big Data

In this session, participants will be introduced to various Graphs made available as Open API's by the world's leading social networks and search engines.

A graph database, also called a graph-oriented database, is a type of NoSQL database that uses graph theory to store, map and query relationships. A graph database is essentially a collection of nodes and edges. A graph data structure consists of a finite (and possibly mutable) set of vertices or nodes or points, together with a set of unordered pairs of these vertices for an undirected graph or a set of ordered pairs for a directed graph.

In this Case Study, you will be introduced to Facebook's Open and Social Graph, LinkedIn's Economic Graph and Google's Knowledge Graph. You will also be introduced to a variety of AI and ML engines that you can utilise to look for hidden insights within the datasets that you intend mashing up and feeding into the AI and ML engines.

Outcomes:

After completion of this section, you should be able to:

- Explain why Graphs play a fundamental role in the AI and ML revolution.
- Discuss the structure of Database Graphs.
- Differentiate between Facebook's Open and Social Graph, LinkedIn's Economic Graph and Google's Knowledge Graph and how to use them.
- Apply them to create for mashup of your data before you activate a ML Engine to work on it.

Session 4: Workshop: The ease of creating your own AI experiment (even for non-programmers)

In this session we will introduce the participants to the process of creating their own first AI experiment. The purpose of this exercise is to demystify the AI and ML environments and to give the participant an idea of the AI ecosystem. The following will be entertained:

- Natural Language
- Robo advice
- Bots e.g. X.ai

DAY 3 – AI: LOOKING UNDER THE HOOD

Session 1: Identifying AI problems within your organisation

To apply AI and ML algorithms successfully to a business problem requires the identification of problems and tasks that can be performed by AI. In this section we will define AI in a business context and delineate AI from closely related concepts such as automation and Big Data. Based on these definitions, we will provide guidelines on how to identify tasks that can be performed by AI and how to identify the requirements and resources to train and deploy an AI solution.

Outcomes:

After completion of this section, you should be able to:

- Identify tasks in your organisation that can be performed by AI.
- Explain the difference between automation and AI.
- Evaluate the difference between Big Data and AI.
- Define the requirements and resources for training and deploying and AI solution.

Session 2: Building an in-house AI competency

Off-the-shelf solutions are available for some problems that can be solved by AI. There are, however, many AI tasks that are unique to an organisation and that might require sensitive data as an input. Under these circumstances, bespoke AI solutions are sometimes required.

In this session we discuss how to determine whether an in-house AI competency is required within an organisation, what components constitute such a competency and how to build an in-house AI competency successfully.

Outcomes:

After completion of this section, you should be able to:

- Determine whether an in-house AI competency is required for your organisation.
- Explain what the advantages of an in-house AI competency are.
- Define what skills are required for an in-house AI competency.
- Map backgrounds and skills team members must have.
- Identify and attract top talent.
- Create a creative and productive work environment for an in-house team.
- Devise training requirements for an AI team.

Session 3: The most popular AI algorithms and their uses

Since there is no single AI algorithm that solves all AI tasks, it is important to know what the state-of-the-art algorithms are, what types of problems they solve and know what the strengths and weaknesses of these algorithms are.

This session will provide you with a deeper understanding of the most used state-of-the-art AI algorithms, explain what type of problems they solve and highlight their respective strengths and weaknesses.

Outcomes:

After this section, you should be able to discuss the philosophy behind each of the following AI algorithms, how they work and what their strengths and weaknesses are:

- Linear Regression
- Support vector regression
- Logistic Regression
- K-means clustering
- Mean-shift clustering
- Naïve Bayes classification
- K-nearest neighbours
- Support vector machines

- Decision trees
- Random forests
- Neural networks
- Deep learning
- Bayesian networks

Session 4: The most popular AI libraries and platforms

Not all AI problems require the development of bespoke AI algorithms from first principles. All of the algorithms discussed in the previous session are available in the form of software libraries. Some of these libraries require the use of a specific platform (e.g. Spark), while other libraries are lightweight and do not require the implementation of a specific platform (e.g. Sci-kit learn).

In this session we will discuss the most popular AI software libraries and platforms and discuss their respective strengths and weaknesses.

Outcomes:

After completion of this section, you should be able to:

- Compare the difference between a software library and software platform.
- Discuss the most popular AI software libraries and platforms.
- Explain the advantages and disadvantages of open source software.
- Select the optimal platform or library for any given AI task.

Session 5: Off-the-Shelf AI – what is available and how easy is it to implement?

In this section, we will concentrate on AI start-ups that offer a specific AI solution to a specific business problem, such as more effective sales lead generation or fraud detection. These companies will be analysed and the type of AI offering will be covered in more detail. The first focal area is AI companies that offer products and services that make large corporates more productive and effective. The second focal area is Off-the-Shelf AI companies that may have a disruptive impact on business models in specific markets.

Outcomes:

After completion of this session, you should be able to:

- Identify the AI companies that may have a disruptive impact on your industry.
- Compare a number of AI products that will help your organisation to be more productive and effective.
- Explain the process you can follow to implement these AI solutions within your organisation.

Session 6: Workshop: Practical implementation of Off-the-shelf AI tools

Participants will be introduced how to use Off-the-shelf AI tools and libraries. The purpose of this exercise is to provide participants with a practical experience of training Off-the-shelf AI algorithms. Participants will also be introduced to the software tools and libraries that they can use to create a test bed for AI experimentation.

Outcomes:

After completion of this session, you should be able to:

- Compare the various AI tools and libraries available in Python.
- Identify which software tools and libraries can be used for a specific AI project.
- Apply existing AI algorithms to AI problems.
- Create a test bed for AI experimentation.

DAY 4 - STARTING THE ENGINE & PREPARING FOR THE RACE AHEAD

Session 1: How to implement and manage an AI project

The traditional approach in managing a project is normally based on the Ordered system ontology. You know where you are, you know where you are going to and you know what steps and actions to take to reach the set objective.

The success of ML is based on the Complex Adaptive Ontology. The starting position in a number of AI projects is unknown. We may use unstructured learning to help us redefine market categorisations. The same algorithm may even give different market segment categorisations in different markets. This signifies that we do not even know what the exact starting conditions to research look like.

Neither do we know which type of algorithm is optimal for our research. Evolution and competition amongst algorithms are used to obtain the optimal algorithm for our unique circumstance.

The end-result is not even obvious in a number of AI projects, as the resulting patterns are truly emergent from the data that has been entered into the process.

Taking all of these insights into consideration, the AI Project is based on allowing experimentation, rather than a bespoke number of steps. The methodology that will be discussed on Day 4 will allow for a more effective approach to AI experimentation.

Outcomes:

After completion of this section, you should be able to:

- Construct a project in which you can use AI to provide competitive insights.
- Identify which software tools can be used to solve a specific problem.
- Map the skill sets required in your organisation to implement and maintain a continued AI expertise.

Session 2: Workshop: Practical implementation of an API call to track Real-Time behaviour

In this session, we will provide a practical session to implement some of the solutions we discussed in the previous session.

Outcomes:

After completion of this section, you should be able to:

- Construct a project to assess banking complaints and house price prediction.
- Interface with N-Gram and Amazon Echo Skills.

Session 3: Comparison of the different tools and development platforms used for AI and ML

In this session, you will be introduced to the different tools and development platforms used in the world of AI and ML. The features, advantages and disadvantages of the various platforms will be discussed so that managers will be able to make informed decisions on the viability of the tools for specific projects.

In addition to the Languages covered above, you will be briefly introduced to other AI solutions such as:

- Open-source editors and frameworks for building intelligent systems.
- Platforms to build smarter ML/AI applications that are fast and scalable.
- Open, enterprise-grade machine learning platforms.
- Services with easy to use, open templates for a variety of intermediate and advanced AI workloads.
- Java Agent Development Framework and simplified multi-agent system development.
- Platforms to allow you to run experiments and make better products with less trial and error.
- Cloud based models and an inference engine to help in model selection.
- Open-source computer vision: Libraries of programming functions aimed mainly at computer vision.

Session 4: The Future of Computation and the impact on the World of Business

In this session, we will use the Theory of Automation to discuss the impact of Intelligent machines. We will further project the impact they have on the Future of Business. To reach this objective, we will look at the Second Machine age, Finite-state machines, Pushdown automation, Linear-bounded automation,

Turing machines and Swarms. We will finally look at the impact of Information Waves on the Future of Business.

Outcomes:

After completion of this section, you should be able to:

- Discuss the impact of Machine Automation on the Future of Business.
- Explain the difference between Finite-state machines, Pushdown automation, Linear-bounded automation, Turing machines and Swarms.
- Explore scenarios in which way these technologies may alter the future of Business.

Session 5: Preparing your organisation for the Road Ahead

In this final session, the road ahead will be discussed. This will look at new developments and trends within the AI and ML domains, and the impact it will have on future operations, marketing research and new business opportunities.

Outcomes:

After completion of this section, you should be able to:

- Discuss the major trends in AI and ML.
- Identify new business opportunities that will lay ahead in the medium and long term that will be made possible via AI and ML.

Facilitators

Dr. Jay van Zyl

Jay is an innovator and entrepreneur in the world of technology innovation. He spent the last three years in Silicon Valley tracking the growth of AI and ML companies. He is a strategic advisor to a number of AI start-ups in London and San Francisco.

He has been involved with AI and Digital Strategy training courses in London, Los Angeles and San Francisco that include companies such as MasterCard, Visa and Discovery as his clients.

He is adjunct faculty at the Gordon Institute of Business Science (GIBS) and California State University. He is also working with the "Innovation for Jobs" community in Silicon Valley as the lead analytics partner based at the Stanford Research Institute.

Dr. Christiaan van der Walt

Christiaan holds a PhD in Machine Learning (ML) and is currently leading the CSIR Advanced Mathematical Modelling ML team.

Christiaan has more than 12 years' experience in the development of novel artificial intelligence and ML algorithms and the application of ML algorithms to solve real-world ML tasks, such as face recognition for biometrics, automatic speech recognition, gait analysis, credit scoring, wind forecasting and the modelling of natural environment systems.

In addition to the research and development of real-world ML systems, he is also supervising postgraduate students in Computer Science, Engineering and Statistics at numerous universities. He is also a specialist editor for the South African Institute of Electrical Engineers (Computer, Information Systems and Software Engineering) and an external examiner for Computational Intelligence at the Department of Electrical Engineering at the University of Cape Town.

Pieter Geldenhuys

Pieter Geldenhuys has a degree in Electronic Engineering, an MBA specialising in Technology Strategy and is currently busy with a PhD thesis on Innovation Management. He is a guest lecturer at Cornell University, Henley Business School, GIBS and NWU. He was the previous Vice-Chair of the Innovation Focus Group at the ITU (International Telecommunication Union) in Geneva, Switzerland. Pieter is the Founder and Director of the Institute for Technology Strategy and Innovation, aligned with North-West University.

DELIVERY METHODOLOGY

The principle of customisation was taken into account with the development of this short learning course customising the learning interventions to the level of the target group and also to the outcomes to be achieved. One of the critical attitudes for success is one's relation to learning and development and interventions with the correct emphasis on the relationship between Knowledge, Skills and Mindsets. All interventions are based on constructivist learning, accommodating multiple intelligences. This briefly means experiential learning and development with an emphasis also on peer-to-peer assistance and evaluation. Facilitator and expert intervention is central to the process for guidance and outcomes purposes.

Most, if not all, of the interventions will be delivered through physical contact sessions. Where circumstances dictate and technology is available, delivery via video conferencing can take place.

Each of the modules will have a complete study guide. In some of the instances textbooks will also be supplied as well as relevant articles.

ACCREDITATION

This short learning course is accredited with the NWU via registration with the Council for Higher Education (CHE) following the NQF processes, allowing the client to claim back up to 60% of the cost (SDL). Accreditation is at an NQF Level 7 with 25 credits.

CONCLUSION

The purpose of this document is to give a brief summary of the modules that constitute the short learning course. The most important characteristic of this course is that the knowledge transferred to the students is of such a nature that it can be practically applied. Although the course encapsulates the latest thinking, both in a technology and management sense, the content of each of the modules is both practical and immediately implementable within the organisation. The facilitators on this course have extensive experience in the AI and ML environments and will therefore convey the content in such a way that the participants do not experience any gap between the reality they face every day and the content within the course.

Please do not hesitate to contact us for any enquiries.

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