MIS780 – Advanced AI for Business

Week 1

Introduction

Dr Anagi Gamachchi

Discipline of Information Systems and Business Analytics,
Deakin Business School

Outline

- **Introduction to MIS780**
- AI Definitions & Concepts
- AI Applications for Businesses
- Social and Ethical Considerations

MIS780 Teaching Team (Burwood and Online)

Dr Anagi Gamachchi

(Unit Chair, Lecturer, and Seminar Instructor)

Expertise: Data Analytics, Machine Learning, Cyber Security, Mathematics and Statistics
Email: mis780@deakin.edu.au

Dr Duy Bo Dao

Expertise: Machine Learning, Deep Learning

Email: mis780@deakin.edu.au

Role: Seminar Instructor, Assessment Marker

Dr Ruwan Nagahawatta

Expertise: Machine Learning, Data analysis, Cyber security, Cloud computing

Email:mis780@deakin.edu.au

Role: Seminar Instructor, Assessment Marker

Dr Thuc Nguyen

Expertise: Machine Learning, Emotion and Generative AI, Visual Sentiment Analysis

Email: mis780@deakin.edu.au

Role: Seminar Instructor, Assessment Marker

Mr. Duc Nghia Chu

Expertise: Time Series Forecasting, Machine Learning, Deep Learning, Natural Language Processing, Big Data Analytics, and Statistical Modelling

Email: mis780@deakin.edu.au

Role: Seminar Instructor, Assessment Marker

Communication

- **Weekly Announcements**:
  - Weekly Update about teaching content, teaching plan, and assignment information update.
- **Discussion Forum**:
  - All general queries relating to weekly content
  - Assessment Requirement Clarification.
  - Technical Questions relating to Python Coding. (Best – Face-to-Face Lab Sessions and consultations)

- **Cloud Deakin** & **Student Connect**:
  - Assessment Extension Requests
  - Special Consideration
- **Weekly Consultation**:
  - Coding Help with Lab Exercises and Assignment Requirement Clarification.
  - Day/Time: **TBC**
- **1:1 Consultations with Anagi**

  Via Anagi's Booking Page

Note: Please do not send emails to teaching staff or the unit chair regarding extensions, as such requests cannot be processed via email and all the extension requests are handled by the faculty.

Timetable – Burwood and Off-Campus Students

2025 - T2 - MIS780 Burwood and Online Lecture

Monday	17:00	18:20	LT13 (HC2.005)	Anagi

2025 - T2 - MIS780 Burwood Seminar Schedu

	Weekday	Begin time	End time	Location
1	Monday	18:30	19:50	LC2.101
2	Monday	18:30	19:50	LC4.100
3	Wednesday	17:00	18:20	LC3.101
4	Wednesday	18:30	19:50	LC3.101
5	Thursday	15:00	16:20	LC4.101
6	Thursday	17:00	18:20	LC3.100
7	Thursday	18:30	19:50	LC3.101
8	Friday	11:00	12:20	LC6.109
9	Friday	12:30	13:50	LC6.109
10	Friday	14:00	15:20	LC6.109

Online Seminar (off-campus students):

Thu 7:00 PM to 8:20 PM – Online via Zoom

- **Contact Time:**
  - 1.5 hours for lecture weekly.
  - 1.5 hours for practical session weekly.
  - Lecture is delivered both on campus and online via **Zoom** for Burwood and Off-Campus Students.
  - Recordings are provided on Cloud Deakin after the classes.

Unit Content & Learning Objectives

- MIS780 is delivered in three modules:
  - **Module 1**: Advanced Text Analytics (Weeks 1-3)
  - **Module 2**: Deep Machine Learning (Weeks 4-6)
  - **Module 3**: Advanced Analytics and AI Systems (Weeks 7-10)

- Unit Learning Outcomes:
  - **ULO1**: Appraise the suitability of major artificial intelligence and advanced machine learning concepts to solve business problems.
  - **ULO2**: Design and develop artificial intelligence solutions for multifaceted business problems.
  - **ULO3**: Critically evaluate and justify the feasibility and efficacy of artificial intelligence solutions in addressing real-world business requirements.

Unit Assessment

- **Assessment 1:** (Weighted **30%**)
  - Data Analysis and Report
  - Analyse data relating to a business problem
  - Deliverable: Report with source code and analysis
- **Assessment 2:** (Weighted **35%**)
  - Data Analysis and Report
  - Analyse data relating to a business problem
  - Deliverable: Report with source code and analysis
- **Assessment 3**: (Weighted **35%**)
  - Business Report
  - Critically evaluate artificial intelligence solutions to business problems

NO FINAL EXAM! NO HURDLE REQUIREMENT!

Unit Schedule

Week	Commencing	Topic	Assessment due date
1	7 July 2025	Welcome and Introduction	
2	14 July 2025	Sentiment Analysis	
3	21 July 2025	Topic Modeling	
4	28 July 2025	Artificial Neural Network	
5^	4 August 2025	Convolutional Neural Network	A1 Due 07 Aug, 8pm AEST
6	18 August 2025	Recurrent Neural Network	
7	25 August 2025	Social Network Analysis	
8	1 September 2025	Evolutionary Computation	A2 Due 04 Sep, 8pm AEST
9	8 September 2025	Recommendation System & Fuzzy Control	
10	15 September 2025	Cognitive Computing & Robotic Process Automation	
11#	22 September 2025	Unit Revision	
12	29 September 2025		A3 Due 02 Oct, 8pm AEST

^ Intra trimester break: **Monday 11 August – Sunday 17 August 2025**

AFL Grand Final Eve public holiday (University closed) **Friday 26 September 2025**

Module 1

Module 2

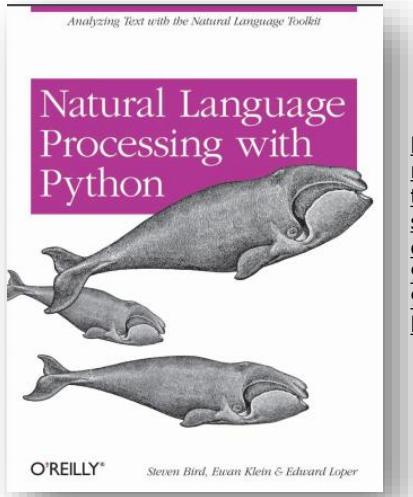
Module 3

Unit Resources

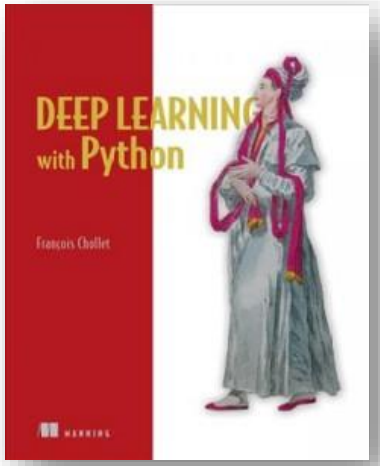
- **Cloud Deakin MIS780**:
  - Lecture Notes
  - Lab Sessions Handbook
  - Assessment resources
  - Announcements (e.g. content updates, changed requirements, etc.)
  - Discussion Forum
  - MS Teams Access
  - Extra Readings (e.g. scholarly articles)
  - Extra Resources (e.g. videos)

Make use of **the Internet**! Good support for Python Programming Exercises.

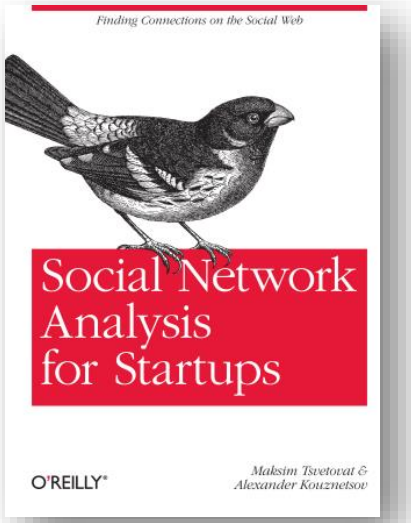
Recommended Textbooks



https://ezproxy.deakin.edu.au/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=cat00097a&AN=deakin.b4089646&site=eds-live&scope=site



https://research.ebsco.com/c/yo5dfu/search/details/u3o7im7p3b?db=nlebk



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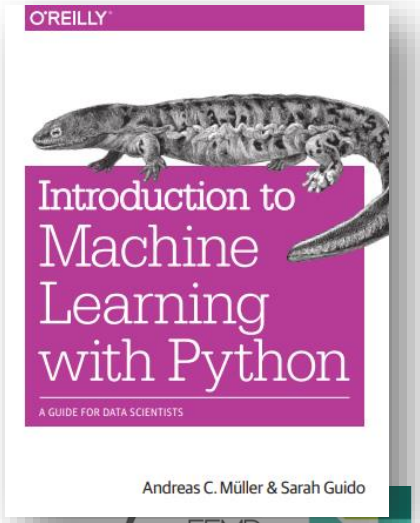

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EFMD EQUIS ACCREDITED

AACSB ACCREDITED

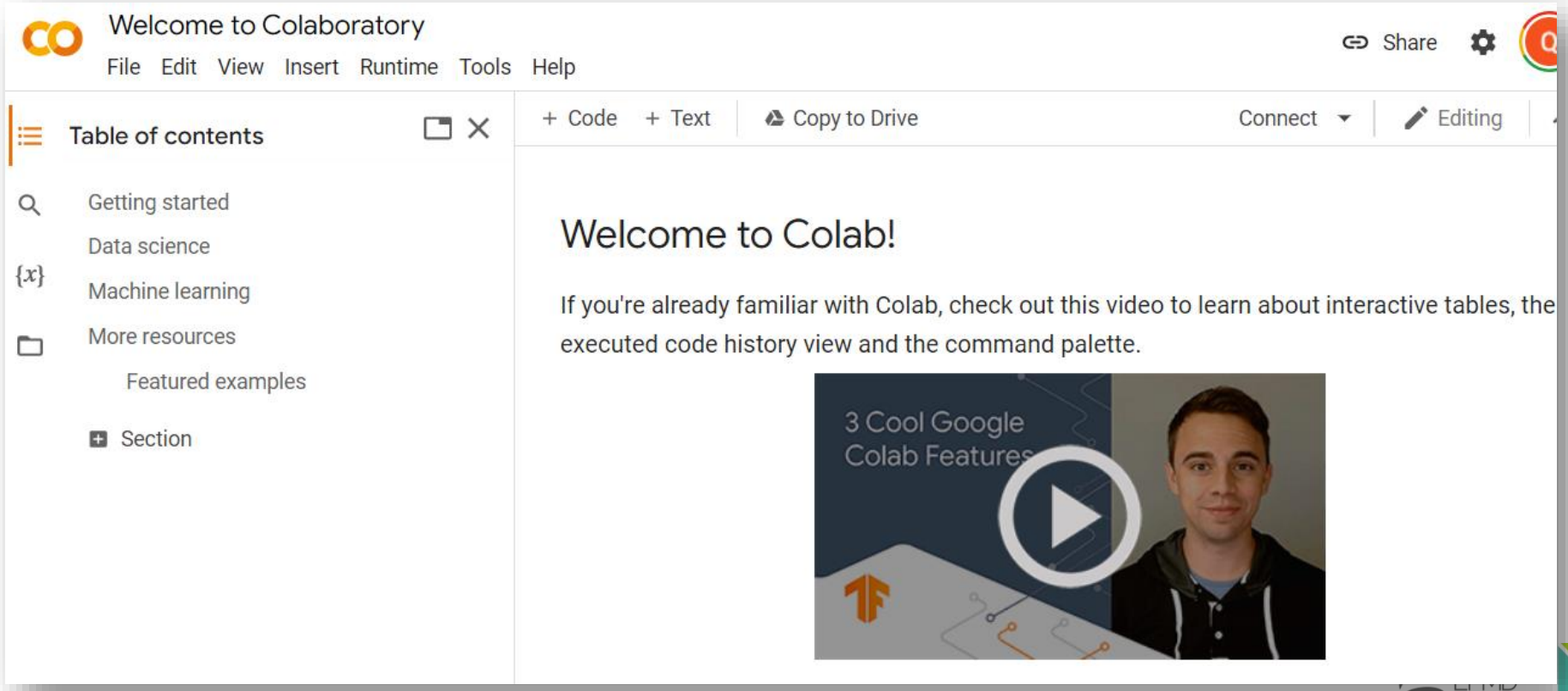
DEAKIN BUSINESS SCHOOL

Software tools

Demo

Google Collab – Python Programming

https://colab.research.google.com/



Google Colab Setup

- Register for a free **Google Account** (if you have not had one)

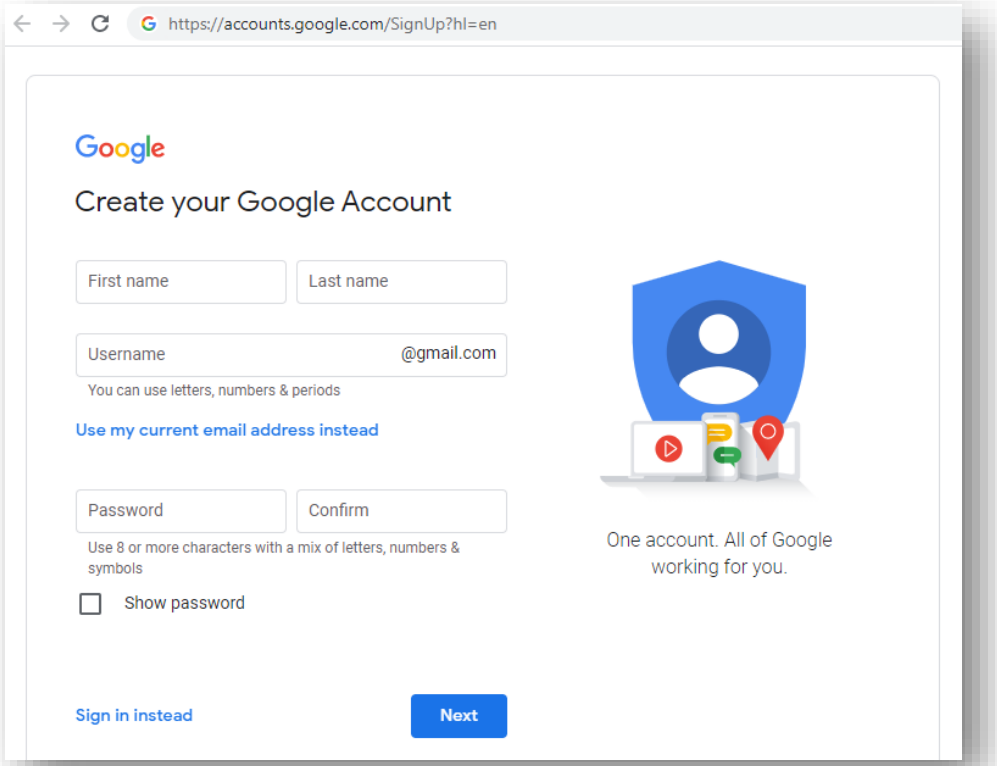
  https://accounts.google.com/SignUp?hl=en

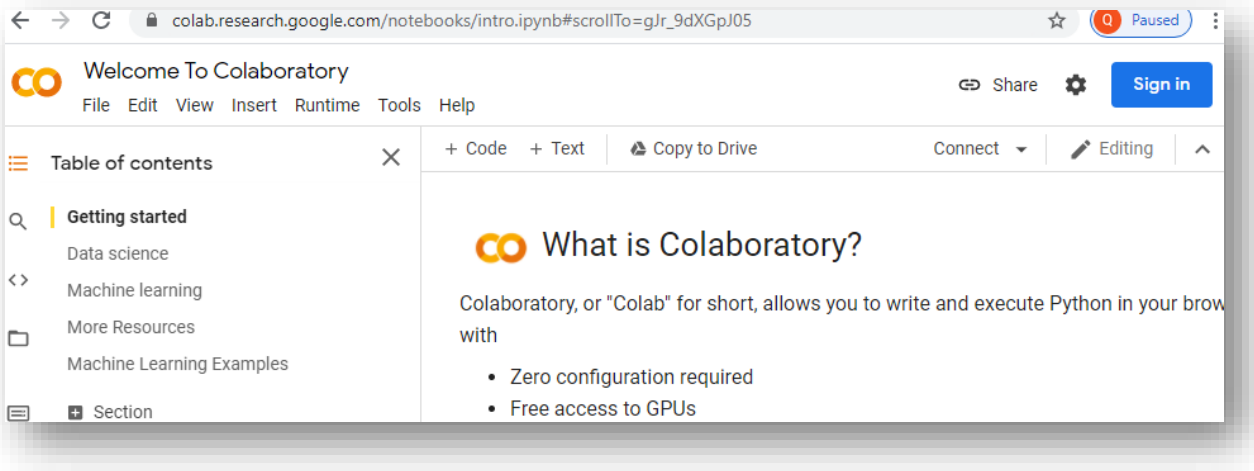
- If you are staying in a country, that does not have access to google service. You can connect to **Deakin VPN** to obtain access

  http://software.deakin.edu.au/2019/04/16/cisco-anyconnect/

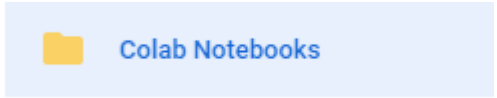
- Once your google account is created, you can sign-in **to Google Colab**, which is a service provided by Google, and can be accessed by your registered Google account.

  https://colab.research.google.com/notebooks/intro.ipynb





After the first sign-in to Google Colab, a new folder named "**Colab Notebooks**" will be created in your google drive.



Why Python?

- **Relatively easy to learn and use**
  - Simple syntax
  - Interpretive, which makes debugging easier
  - Don’t have to worry about managing memory
- **Modern**
  - Supports object-oriented programming
- **Increasingly popular**
  - Large and ever growing set of libraries
  - Increasing use in industry

Data Scientist (junior to mid level)

Earth AI

Sydney > Parramatta & Western Suburbs

$100,000 - $130,000

- Intellectually stimulating, high-impact work
- High growth startup environment which you will have the chance
- An interdisciplinary, collaborative, creative, fun-loving team

Predictive Analyst

illion Australia & New Zealand

Melbourne > CBD & Inner Suburbs

Great Opportunity & Rewards

An exciting opportunity to join the team that brings Data & Analytics t

Data Engineer

Launch Recruitment Pty Ltd

Sydney

$140000 - $170000.00 per annum

- $150k to $170k base
- Build a Greenfiled Machine Learning Platform
- Work with Smart, Passionate people!

JOB TITLE: https://www.seek.com.au/

Outline

- Introduction to MIS780
- **AI Definitions & Concepts**
- AI Applications for Businesses
- Social and Ethical Considerations

What is AI? (cont.)

- There is no clear consensus on the definition of AI
- **Artificial intelligence** (AI) can be simply understood as an area of computer science that emphasizes the creation of **intelligent machines** that **work** and **react like humans**.

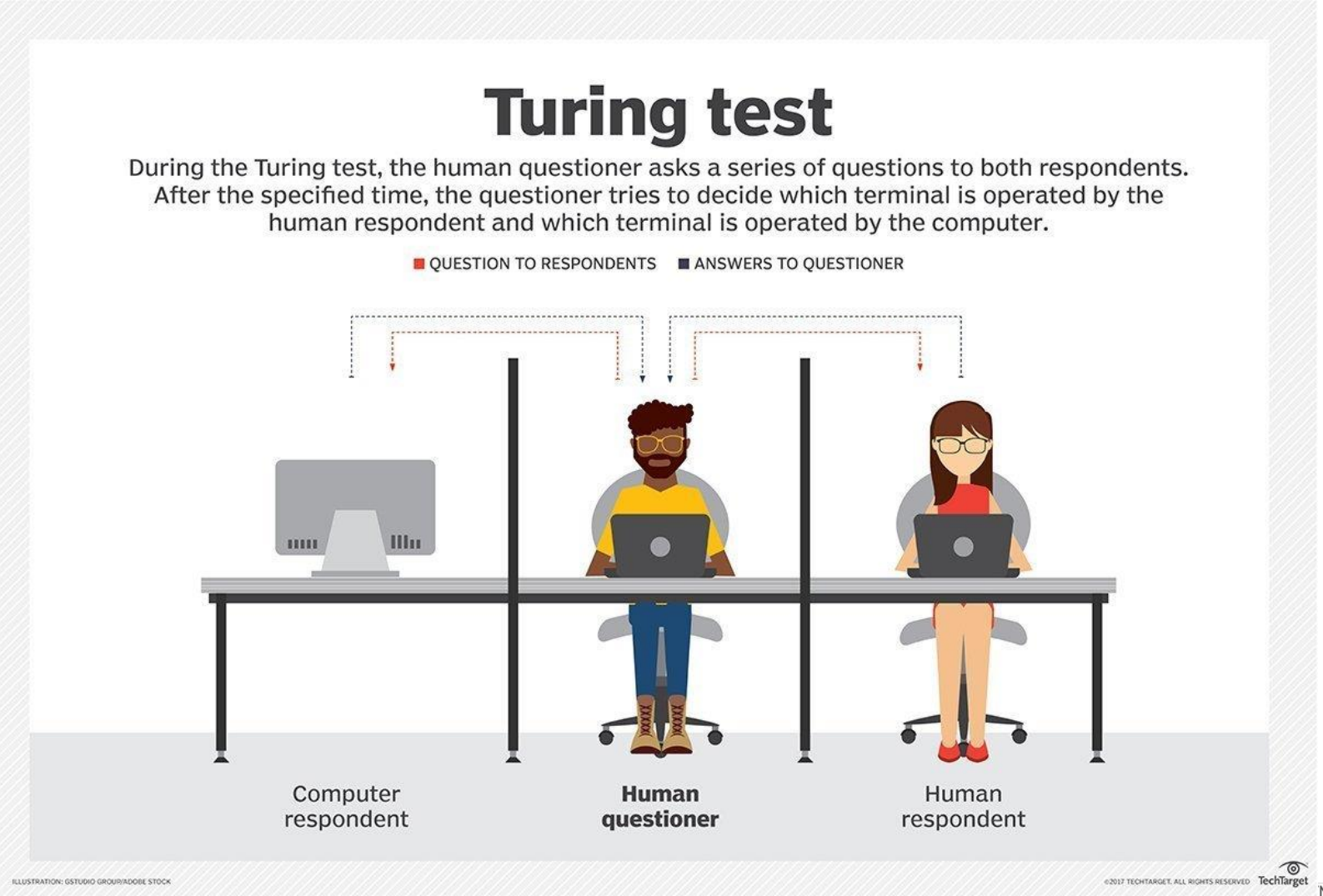
Q. ***Yes, but what is intelligence?***

A. To be called **intelligent**, a machine must produce responses that are *indistinguishable* from those of a human

Alan Turing

https://www.techopedia.com/definition/190/artificial-intelligence-ai

Intelligence Test



https://cdn.ttgtmedia.com/rms/onlineImages/crm-turing_test.jpg

Categorization of AI definitions

To reason human

- *"The exciting new effort to make computers think . . . machines with minds, in the full and literal sense"* (Haugeland, 1985)
- *"The automation of activities that we associate with human thinking, activities such as decision-making, problem solving, learning. . . "* (Bellman, 1978)

To reason rationally

- *"The study of mental faculties through the use of computational models."* (Charniak i McDermott, 1985)
- *"The study of the computations that make it possible to perceive, reason, act."* (Winston, 1992)

To act human

- *"The art of creating machines that perform functions that require intelligence when performed by people."* (Kurzwil, 1990)
- *"The study of how to make computers do things at which, at the moment, people do better."* (Rich i Knight, 1991)

To act rationally

- *"The field of study that seeks to explain and emulate intelligent behavior in terms of computational processes."* (Schalkoff, 1990)
- *"The branch of computer science concerned with automation of intelligent behavior"* (Luger i Stubblefield, 1993)

No widely agreed-upon definition of Artificial Intelligence

https://www.fer.unizg.hr/_download/repository/AI-1-Introduction.pdf

Discussion Question

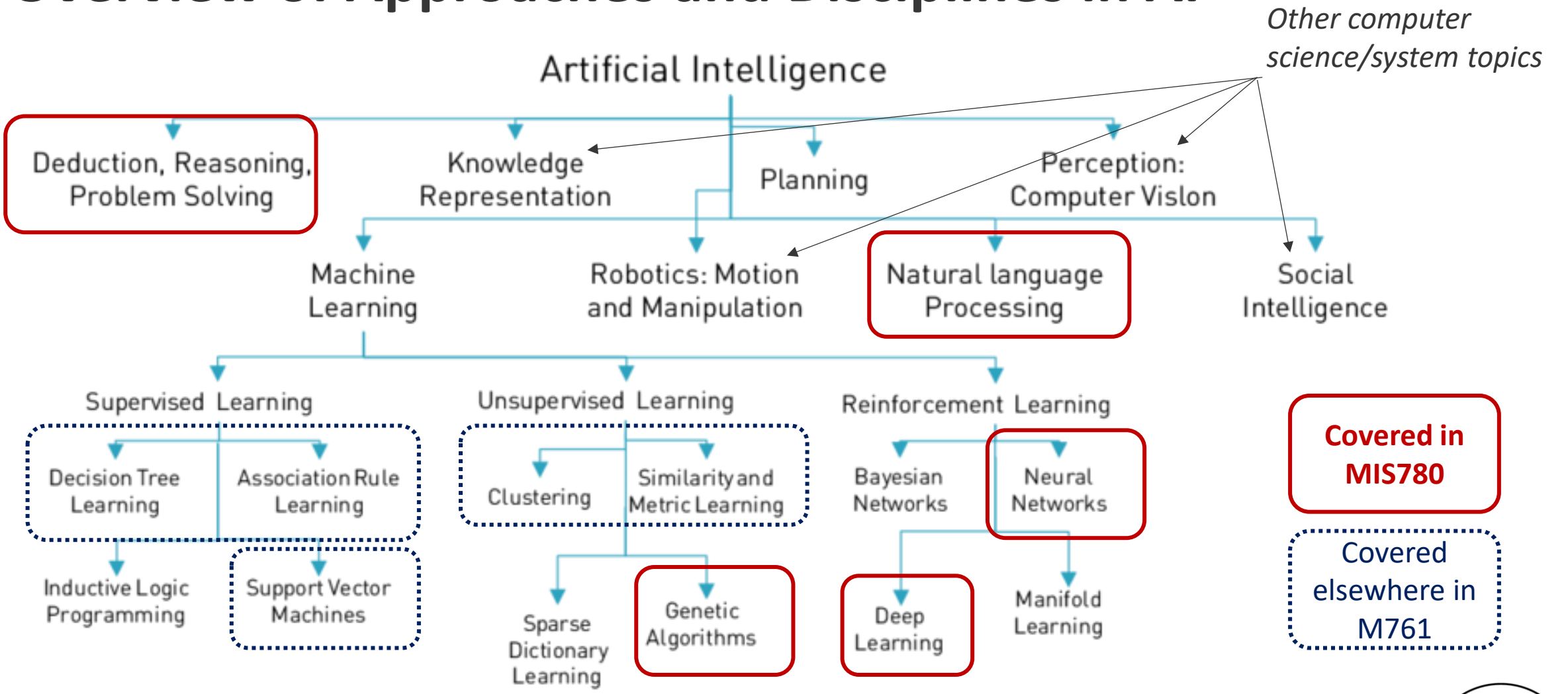
The Turing Test subscribes to a particular definition of AI. Which category does this definition belong to?

(A) To think human	**(C)** To think rationally
(B) To act human	**(D)** To act rationally

What abilities would a machine need to have to pass the Turing Test?

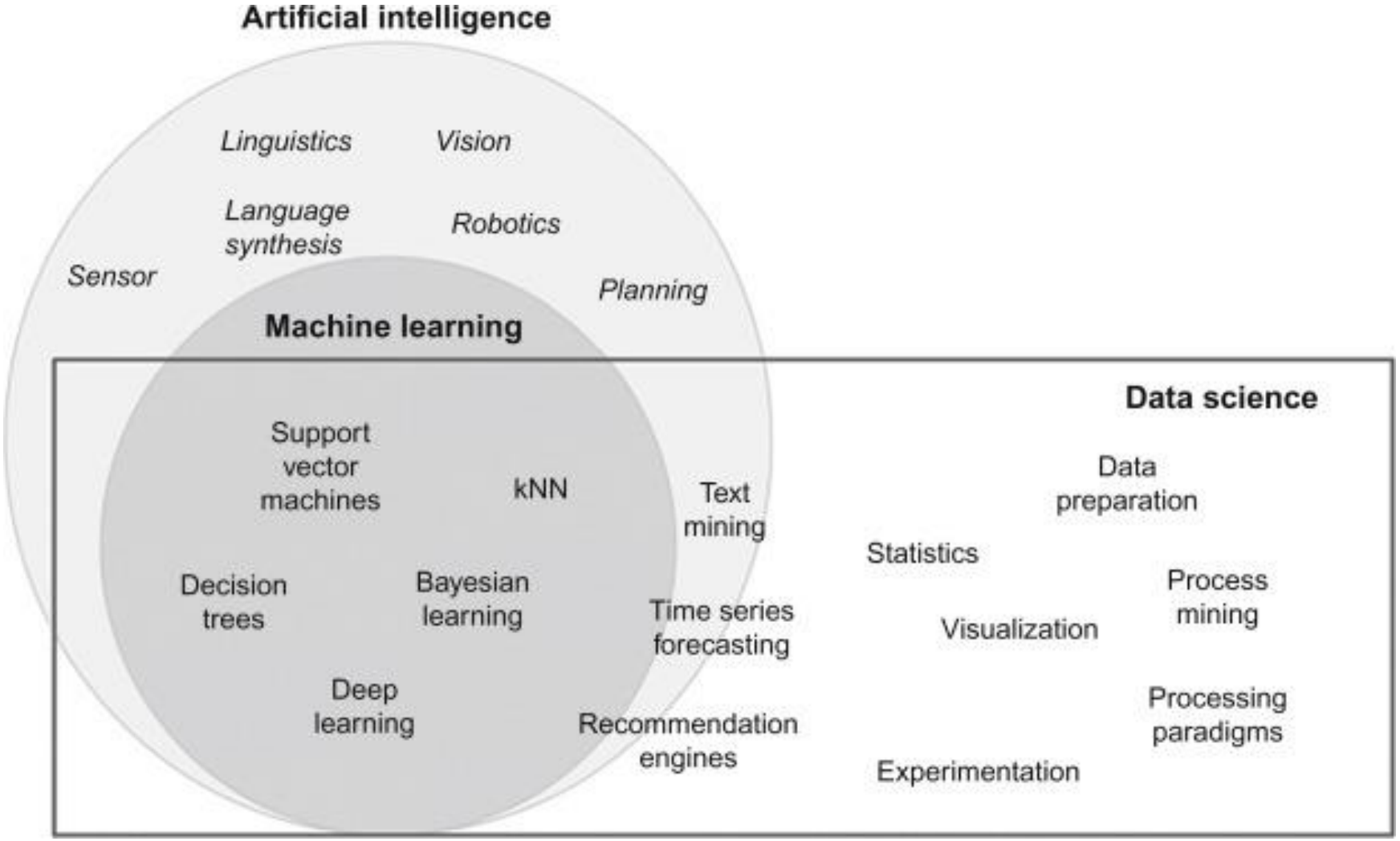
- natural language processing
- knowledge representation
- automated reasoning
- learning

Overview of Approaches and Disciplines in AI



De Spiegeleire, S., Maas, M. M., & Sweijs, T. (2017). Artificial Intelligence and the Future of Defense: Strategic Implications for Small- and Medium-Sized Force Providers. The Hague: The Hague Centre for Strategic Studies.

Artificial Intelligence vs. Data Science



https://www.sciencedirect.com/topics/physics-and-astronomy/artificial-intelligence

Outline

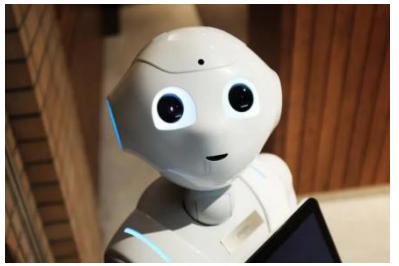
- Introduction to MIS780
- AI Definitions & Concepts
- **AI Applications for Businesses**
- Social and Ethical Considerations

Applications of AI

AI has been dominant in various fields, such as:

- **Gaming** – Strategic games such as chess, poker, tic-tac-toe, etc., machine can think of large number of possible positions.
- **Natural Language Processing** – It is possible to interact with the computer that understands natural language spoken by humans.
- **Expert Systems** – integrate machine, software, and special information to impart reasoning and advising users.
- **Vision Systems** – These systems understand, interpret, and comprehend visual input on the computer.
- **Speech Recognition** – hearing and comprehending the language in terms of sentences and their meanings while a human talks
- **Handwriting Recognition** – The handwriting recognition software reads the text written on paper.
- **Intelligent Robots** – perform the tasks given by a human.

Connie Robot



Google self-driving cars

NASA Autonomous Rover

https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.htm

AI in Everyday Life

01

VIRTUAL ASSISTANTS

Ai powered virtual assistants can streamline daily schedules and manage tasks.

02

TRANSLATORS

The dream of universal communication is closer than ever, with AI acting as our global interpreter.

03

FRAUD DETECTION

Banks and Financial institutions use AI to detect suspicious transactions and prevent fraud.
Pay attention to your suspicious financial activity alerts.

04

FITNESS AND HEALTH APPS

Health AI empowers individuals to take control of their well-being, blending motivation, prevention, and awareness.

05

WEATHER PREDICTION

Weather prediction is one of the most tangible examples of AI's power to turn data into life-saving insights.

AI in Everyday Life: 20 Real-World Examples

Examples of AI Applications in Business

Field	Organization	Applications
Energy	Halliburton	Improve underground, drilling and production workflows through AI and ML (Who are the leading innovators in oil exploration AI for the oil & gas industry?)
Government	Internal Revenue Service	Enhance operations and improve tax administrations (IRS Using AI | Foley & Lardner LLP)
Human Services	Allegheny County, Pennsylvania	Assist social workers in making critical decisions about child welfare cases (Real-Life Examples of AI Making a Difference in Human Services | HumanServices.ai (HSAI))
Marketing	Sephora	The company has implemented a chatbot on its website and mobile app that uses machine learning algorithms to personalise the customer experience and provide support and recommendations to shoppers. (AI in Marketing - 4 Real-World Examples and Case Studies)
Telecommunication	BT Group	Provide coding assistance to its software engineers, aimed at enhancing product development processes across the business. (How BT Group is Deploying Gen AI Coding Solutions With AWS | Technology Magazine)
Inventory Forecasting	Hyundai Motors	Neural Networks and expert system used to reduce delivery time by 20% and increase inventory turnover from 3 to 3.4

Pros and Cons of AI

Pros:

- more powerful and more useful computers
- new and improved interfaces
- solve new problems
- better handling of information
- relieves information overload
- conversion of information into knowledge

Cons:

- Increased costs
- Decisions can be biased
- Ethical dilemmas
- Can destroy jobs

15 Pros and Cons of Artificial Intelligence You Should Know

Outline

- Introduction to MIS780
- AI Definition & Concepts
- AI Applications for Businesses
- **Social and Ethical Considerations**

What is AI ethic?

- AI is a new and rapidly evolving technology.
- A steep learning curve means that
  - mistakes and miscalculations will be made
  - both unanticipated and harmful impacts will inevitably occur.

"AI ethics is a set of values, principles, and techniques that employ widely accepted standards of right and wrong to guide moral conduct in the development and use of AI technologies."

- Make AI ethics and safety a first priority:
  - to manage impacts responsibly
  - to direct the development of AI systems toward optimal public benefit.
  - Considering the social and ethical implications of the design and use of AI systems into every stage of the AI project.

Leslie, D. (2019). Understanding artificial intelligence ethics and safety. The Alan Turing Institute. https://doi.org/10.5281/zenodo.3240529

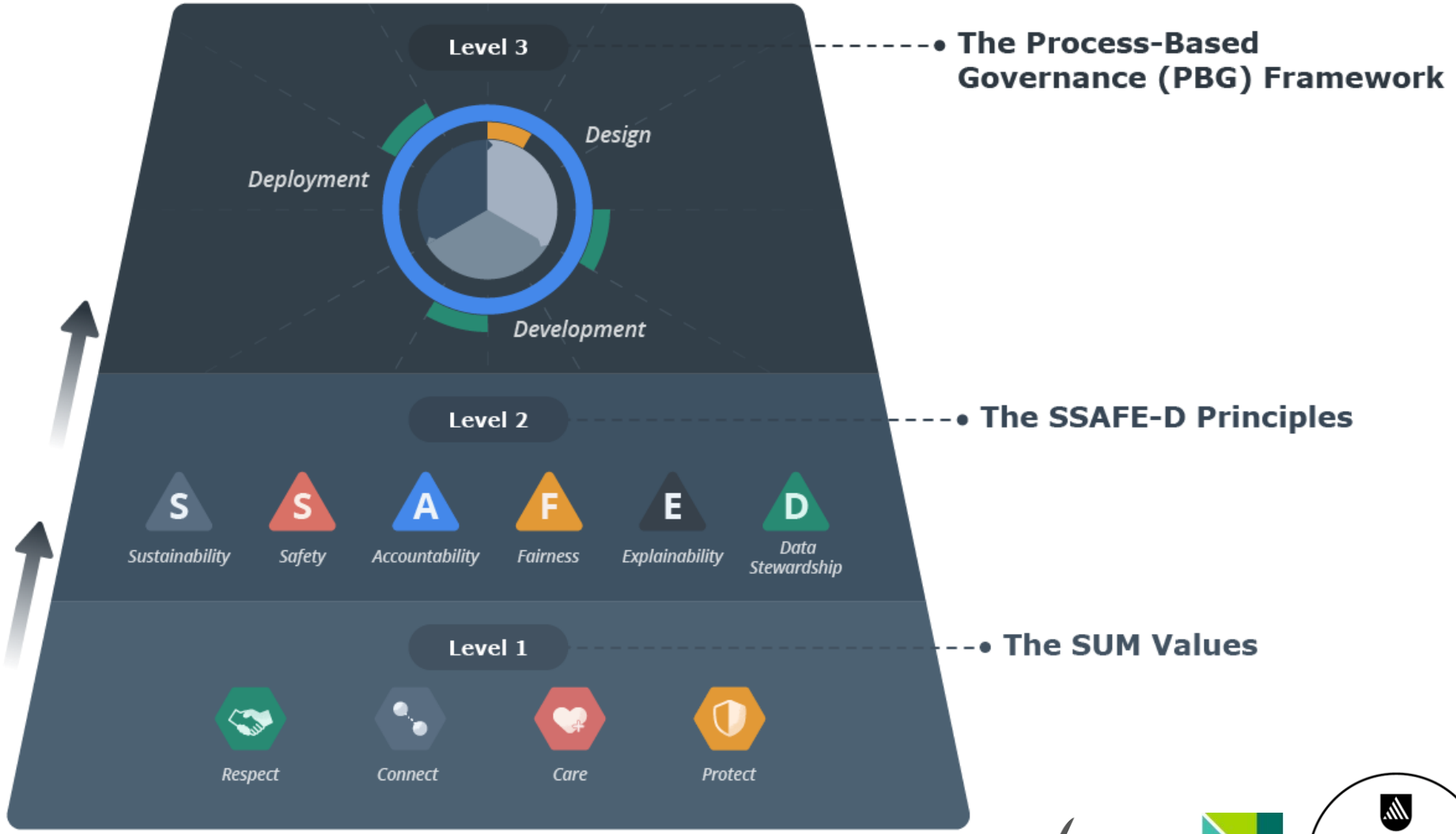
Potential Harms Caused by AI Systems

- **Bias and Discrimination -** features, metrics, and analytic structures of the models can potentially replicate designers' preconceptions and biases.
- **Denial of Individual Autonomy, Recourse, and Rights -** citizens are subject to decisions, predictions, or classifications produced by AI systems, which is difficult to pinpoint accountable parties
- **Non-transparent, Unexplainable, or Unjustifiable Outcomes -** results may be generated from high dimensional correlations that are beyond the interpretive capabilities of human scale reasoning.
- **Invasions of Privacy -** personal data are captured without the proper consent of the data subject or is handled in a way that reveals personal information.
- **Isolation and Disintegration of Social Connection -** Excessive automation, for example, might reduce the need for human-to-human interaction.
- **Unreliable, Unsafe, or Poor-Quality Outcomes** – caused by Irresponsible data management, negligent design and production processes, and questionable deployment practices .

Leslie, D. (2019). Understanding artificial intelligence ethics and safety. The Alan Turing Institute. https://doi.org/10.5281/zenodo.3240529

Ethical Platform for AI Project

Three building blocks of a **responsible AI project delivery ecosystem**:



https://www.youtube.com/watch?v=viyXQhPAqME&t=3s
https://aiethics.turing.ac.uk/modules/introduction/?modulepage=process-based-governance-framework

Ethical Platform for AI Project

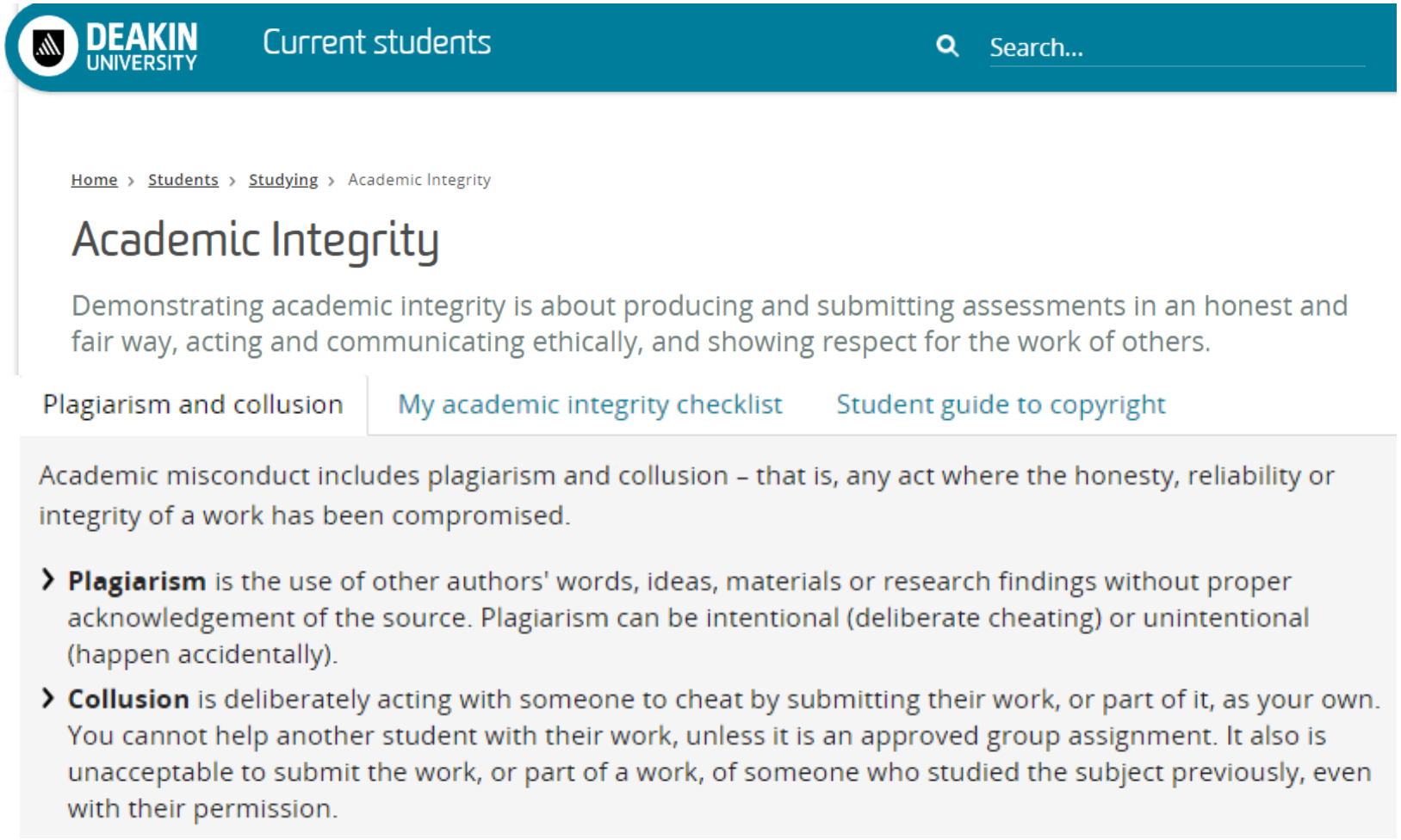
Level 1: The **SUM Values** are a set of ethical values intended to provide general normative guideposts and moral motivations for thinking through the social and ethical aspects of AI projects, and to establish well-defined criteria to evaluate their potential impacts as well as their ethical permissibility.

Level 2: At the second, and more concrete level, the **SSAFE-D Principles** are a set of actionable goals which provide tools to make sure that AI projects are bias-mitigating, non-discriminatory, and fair, and that they safeguard public trust in their capacity to deliver safe, sustainable, accountable, transparent, and reliable AI innovation.

Level 3: At the third and most concrete level, the **Process-Based Governance (PBG)** Framework provides a mechanism for integrating the SSAFE-D Principles within AI design, development, and deployment processes as well as a template for documenting corresponding governance actions.

https://aiethics.turing.ac.uk/modules/introduction/?modulepage=process-based-governance-framework

Plagiarism Notice



Academic Integrity | Students
Academic integrity dos and don'ts | Students
Referencing | Students

In this lecture, we have:

- Been introduced to MIS780 teaching team and learning resources.
- Understood AI definitions and Concepts
- Examined various AI applications
- Discussed the Social and Ethical Concern in the delivery of AI project.

Summary