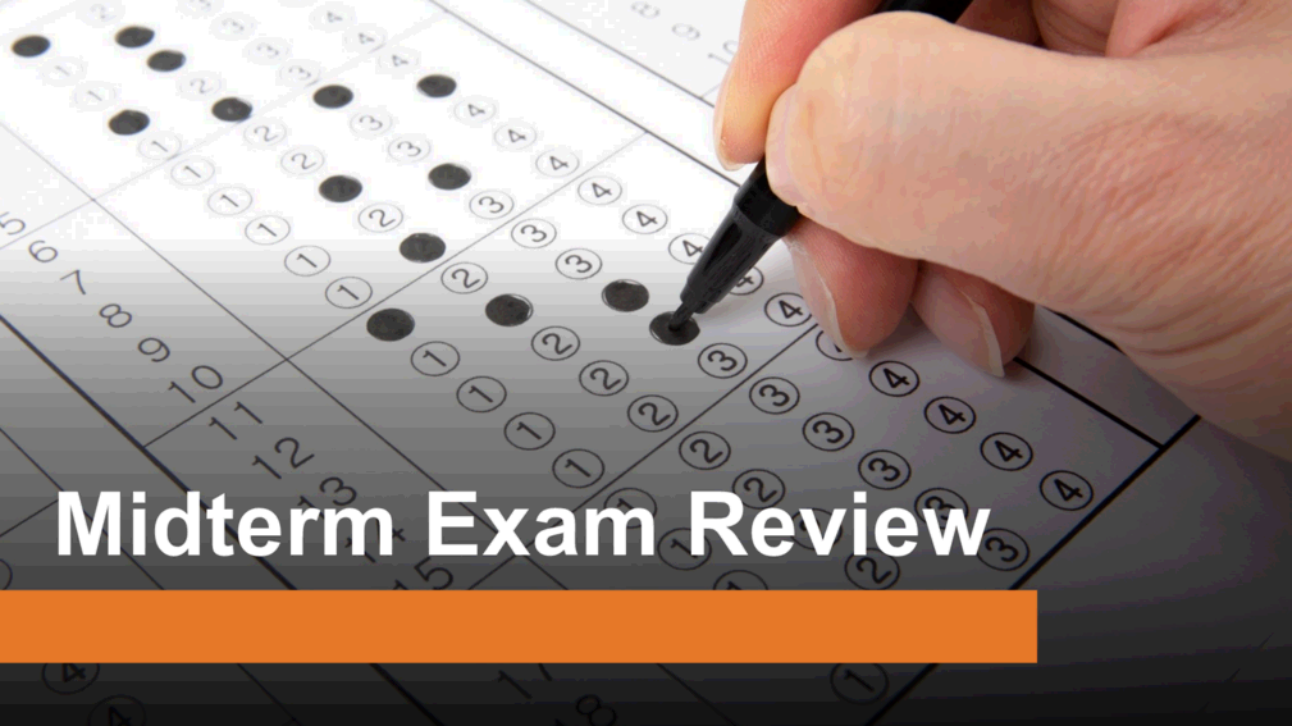




01416305

Artificial Intelligence Technology

Lecture # 6



Midterm Exam Review

Midterm Exam

Subject	01416305 ARTIFICIAL INTELLIGENCE TECHNOLOGY	Year	2
Date	Tuesday 21 st January 2025	Time	13.30-16.30

Explanation:

- This Examination has 100 questions, 16 pages, total score 100 points
☒ Answer all questions
- Answer the questions in ☐ the examination ☒ a multiple-choice answer sheet
☐ an answer book ☐ other.....
- A calculator is ☐ not allowed ☒ allowed
- Document, notes or class materials
☒ Not allowed
☐ Allowed as follows;
- If any notes are allowed
☐ submit all notes together with the examination ☐ no need to submit
- Other electronics devices i.e. laptop, measurement tool etc..
☒ Not allowed
☐ Allowed as follows;

*****Bring 2B pencils*****

Types of AI

- **Artificial Narrow Intelligence (ANI)** also called “**weak AI**”.

Narrow AI is a specific type of Artificial Intelligence technology that will enable computers to outperform humans in some very narrowly defined task

- Most common form of AI today e.g. Siri (from Apple), Alexa (from Amazon), Google search, Google translate, etc.

- **Artificial General Intelligence (AGI)** also called “**strong AI**”.

Artificial General intelligence is the capability of a machine to perform the same intellectual tasks as a human to the same standard as humans

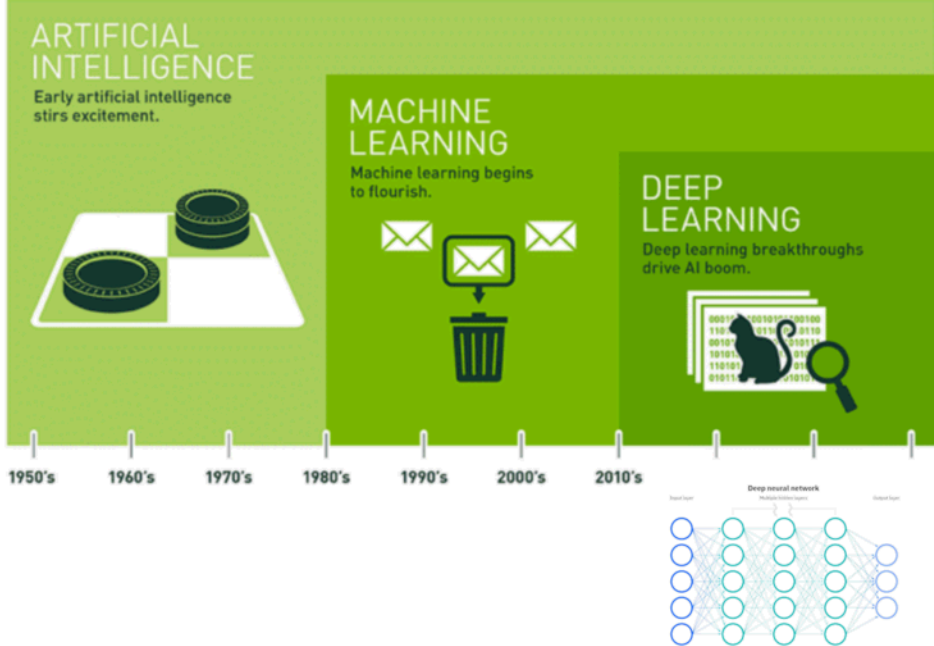
- Still a theoretical concept

- **Artificial Super Intelligence (ASI)**

Artificial Super Intelligence (ASI) is a super intelligent computer that can possess an intelligence that far surpasses that of the brightest and most gifted human minds.

- Hypothetical AI

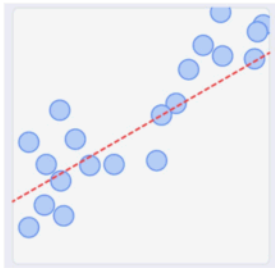
AI & Machine Learning & Deep Learning



Machine Learning

Supervised Learning is the machine learning approach defined by its use of **labeled datasets** to train algorithms to classify data and predict outcomes.

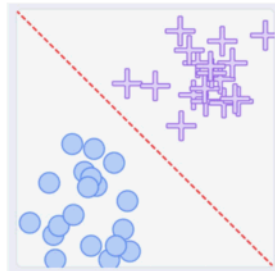
Regression is related to **continuous** data (value functions). In Regression, the predicted output values are real numbers.



Examples: predict the price of a house
trend in the stock price at a given time

Evaluation Methods: RMSE, MSE, MAE, MAPE

Classification refers to taking an input value and mapping it to a **discrete** value. In classification problems, our output typically consists of classes or categories.



Examples: predict what objects are present in an image
predict whether it is going to rain today or not

Evaluation Methods: Confusion matrix, Accuracy, F1 score, ROC, AUC

Evaluation Methods (Regression problem)

Mean squared error

$$\text{MSE} = \frac{1}{n} \sum_{t=1}^n e_t^2$$

Root mean squared error

$$\text{RMSE} = \sqrt{\frac{1}{n} \sum_{t=1}^n e_t^2}$$

Mean absolute error

$$\text{MAE} = \frac{1}{n} \sum_{t=1}^n |e_t|$$

Mean absolute percentage error





$$\text{MAPE} = \frac{100\%}{n} \sum_{t=1}^n \left| \frac{e_t}{y_t} \right|$$

Evaluation Methods (Classification problem)

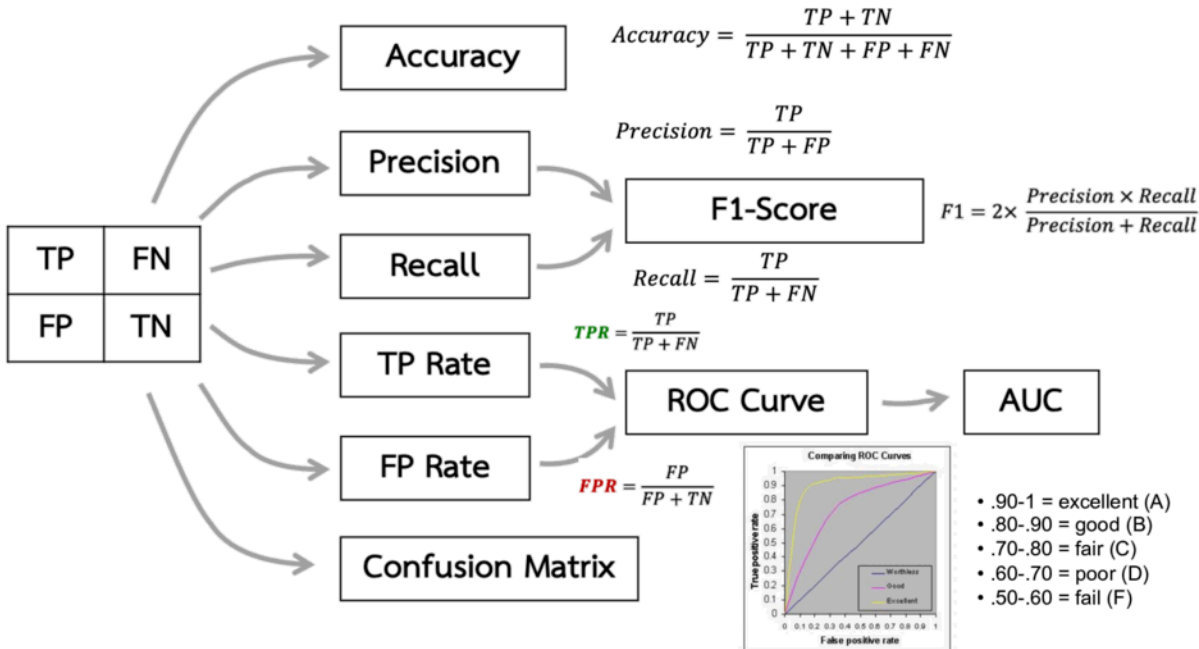
Confusion Matrix

A confusion matrix is formed from the four outcomes produced as a result of binary classification

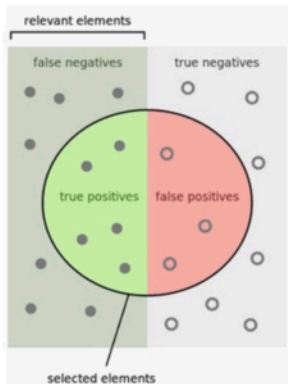
- **True positive (TP):** correct positive prediction
- **False positive (FP):** incorrect positive prediction
- **True negative (TN):** correct negative prediction
- **False negative (FN):** incorrect negative prediction

	predicted: YES	predicted: NO
actual: YES	 (true positive)	 (false negative)
actual: NO	 (false positive)	 (true negative)

Evaluation Methods (Classification problem)



TP Rate & FP Rate



	predicted: YES	predicted: NO
actual: YES	(true positive)	(false negative)
actual: NO	(false positive)	(true negative)

- True-Positive Rate

$$TPR = \frac{TP}{TP + FN}$$



TPR = probability that an actual positive is correctly predicted as positive by the model

- False-Positive Rate

$$FPR = \frac{FP}{FP + TN}$$



FPR = probability that an actual negative is incorrectly predicted as positive by the model