A Beginner's Guide to Hands-On AI Concepts and Coding

Shier Nee Saw, PhD

Department of Artificial Intelligence,
Faculty of Computer Science and Information Technology,
Universiti Malaya

sawsn@um.edu.my

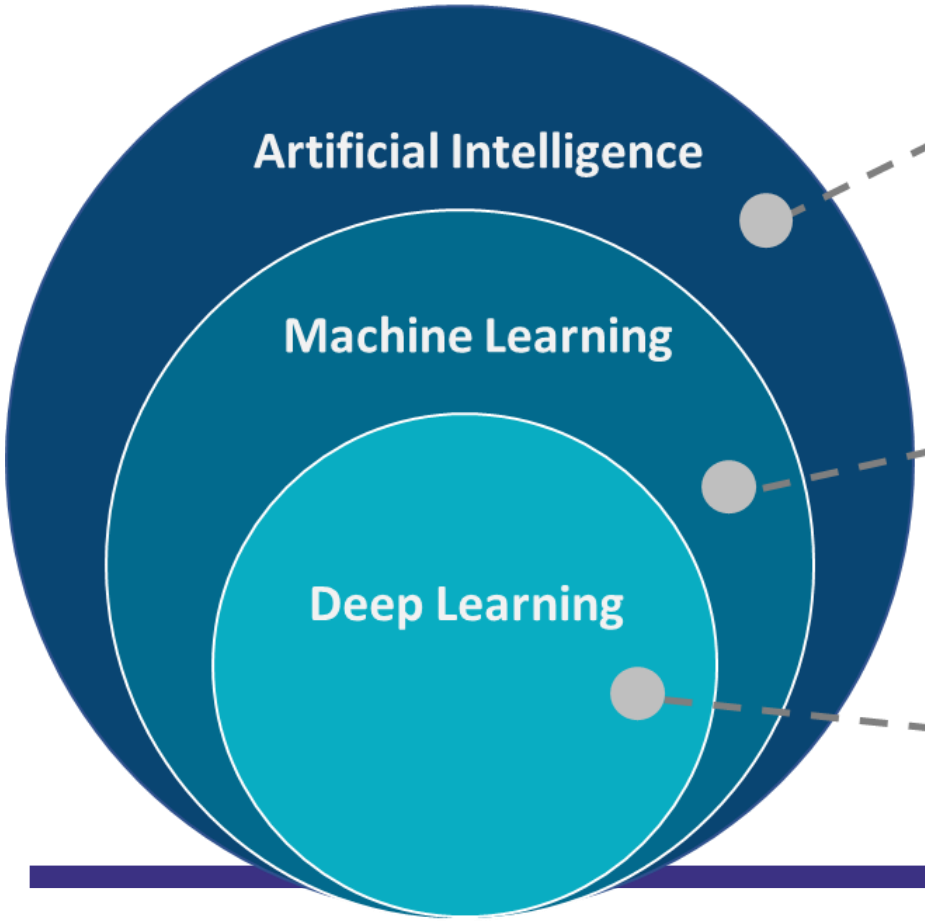
https://shiernee.com

Outline

1. Artificial Intelligence Overview
2. Classification Concept
3. Hands-on Python Workshop

UNIVERSITY OF MALAYA

What is AI? ML? DL?

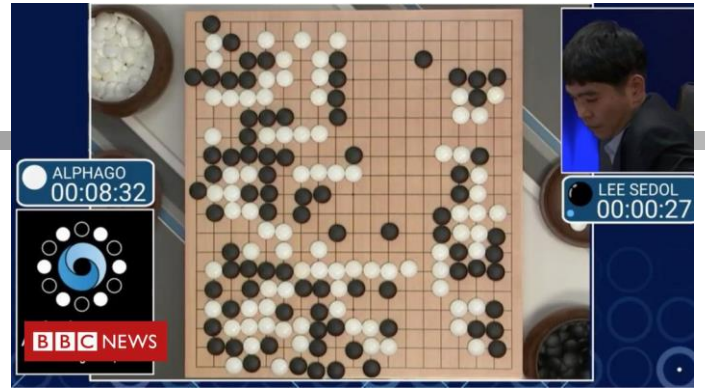


Artificial Intelligence
A technique which enables machines to mimic human behaviour

Machine Learning
Subset of AI technique which uses statistical methods to enable machines to improve with experience.

Deep Learning
Subset of Machine Learning which make the computation of multi-layer neural network feasible

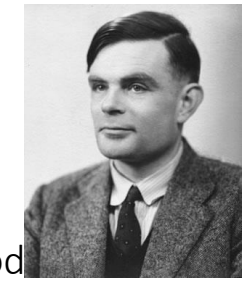
History of AI



https://www.bbc.com/news/technology-35785875

"Can machines think?"

Alan Turing introduce a method for machine intelligence



https://editions.covecollective.org/chronologies/alan-turing-%E2%80%9Ccomputing-machinery-and-intelligence%E2%80%9D-1950

First AI Winter

Second AI Winter

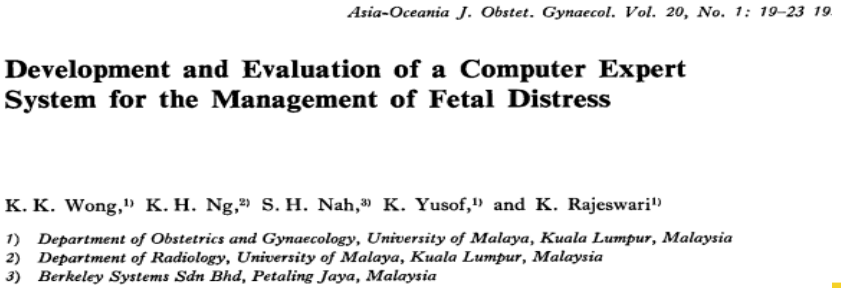
Alpha Go defeated Lee Sedol, world champion of Go

1950 | 1966 | 1975 | 1980 | 1987 | 2016 | Now

First Chatbot:

https://www.computerhope.com/jargon/e/eliza.htm

Expert



Asia-Oceania J. Obstet. Gynaecol. Vol. 20, No. 1: 19–23 19

Development and Evaluation of a Computer Expert System for the Management of Fetal Distress

K. K. Wong,[1] K. H. Ng,[2] S. H. Nah,[3] K. Yusof,[1] and K. Rajeswari[1]

1) *Department of Obstetrics and Gynaecology, University of Malaya, Kuala Lumpur, Malaysia*
2) *Department of Radiology, University of Malaya, Kuala Lumpur, Malaysia*
3) *Berkeley Systems Sdn Bhd, Petaling Jaya, Malaysia*

AI in everywhere

UNIVERSITY OF MALAYA

AI Techniques

Supervised Learning	Unsupervised Learning	Reinforcement Learning
Labelled data with guidance	No labelled without guidance	Interacts with environment, decide action, learns by trial and error method

UNIVERSITY OF MALAYA

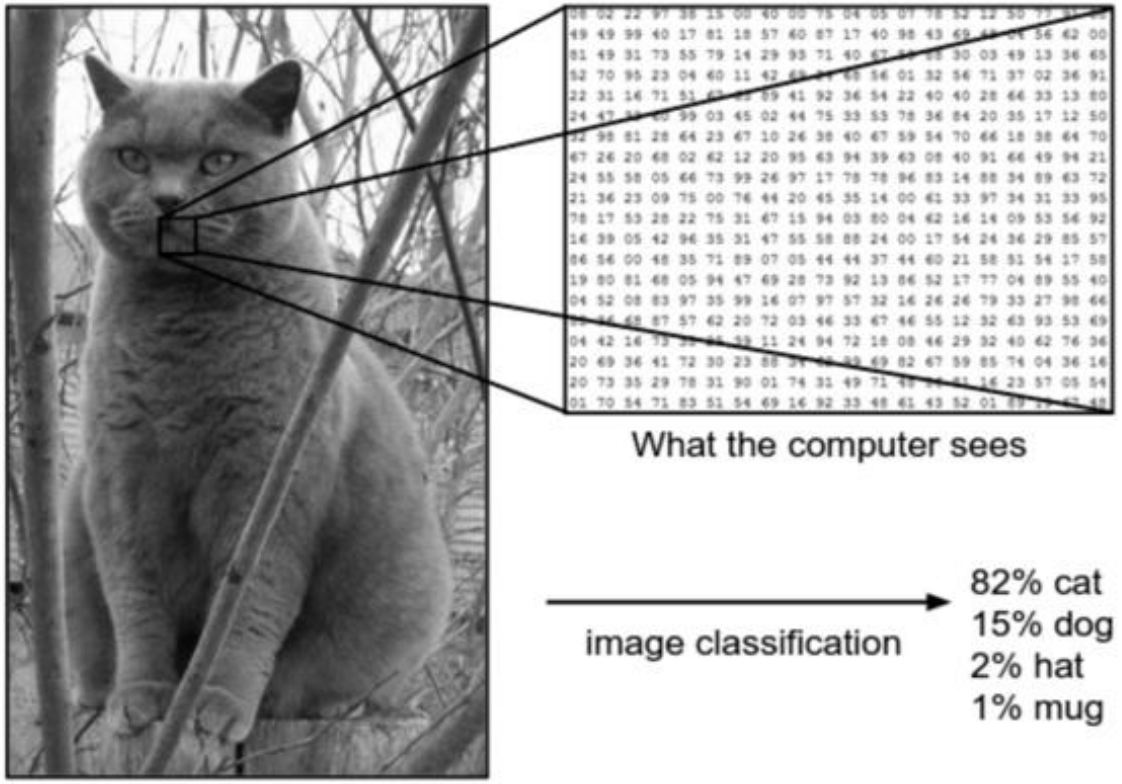
Supervised Learning - Classification

index	sl	sw	pl	pw	label
0	5.1	3.5	1.4	0.2	Setosa
1	4.9	3.0	1.4	0.2	Setosa
	...				
50	7.0	3.2	4.7	1.4	Versicolor
	...				
149	5.9	3.0	5.1	1.8	Virginica

$$input\ space, \mathcal{X} = numeric\ features$$
$$\mathcal{X} = \mathbb{R}^4$$
$$f: \mathcal{X} \rightarrow \mathcal{Y}$$

Convolutional Neural Network

- When your input is a Grey Scaled Image



$$input\ space, \mathcal{X} = \ \ set\ of\ images$$

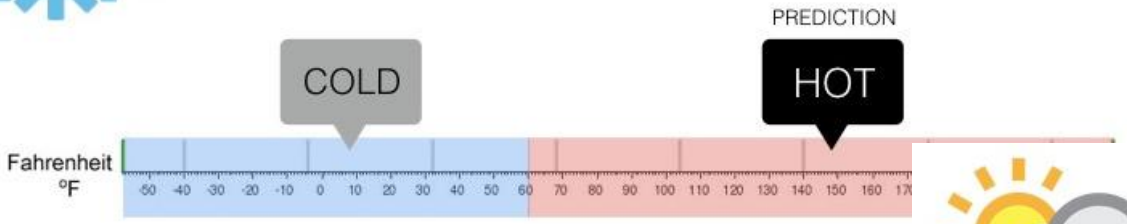
$$\mathcal{X} = \ \mathbb{R}^D, where\ D = 2$$

$$f: \mathcal{X} \to \mathcal{Y}$$

Supervised Learning - Classification

Classification

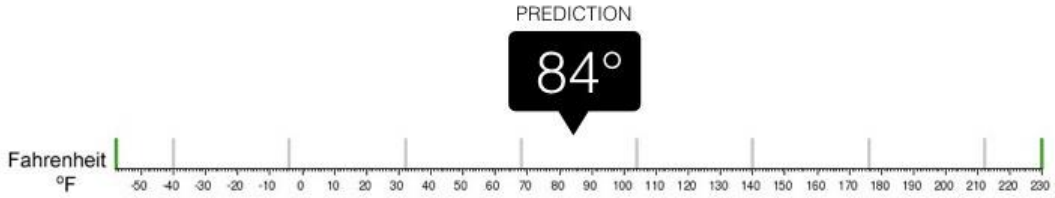
Will it be Cold or Hot tomorrow?



Output: Categorical data

Regression

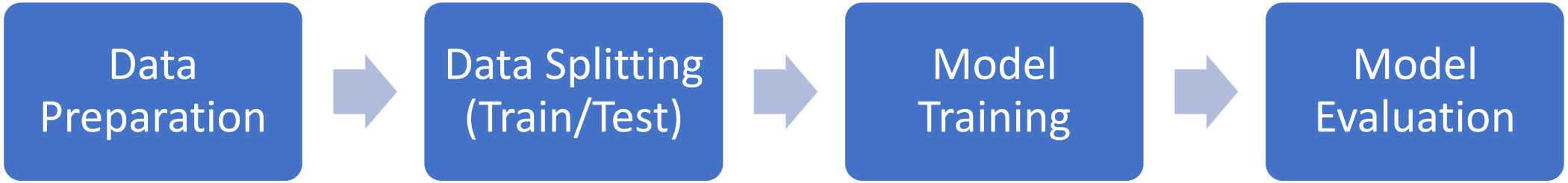
What is the temperature going to be tomorrow?



Output: Continuous data

UNIVERSITY OF MALAYA

Machine Learning Pipeline



Classification

y=f(x)

Y = mx+c

Y =σ(mx+c)

Activation function:
Convert to probabilities

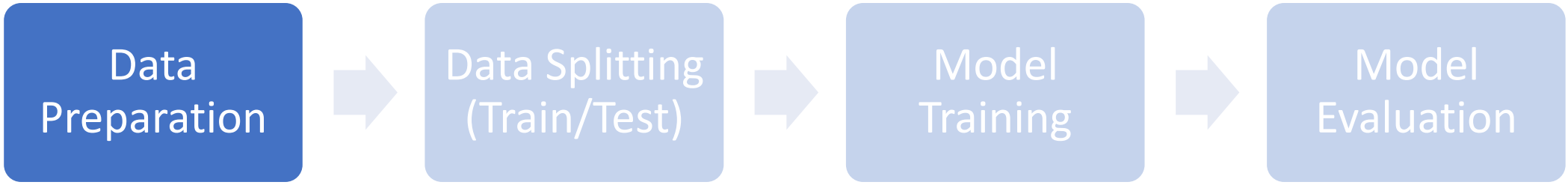
Regression:

y = f(x)

y = mx+c

UNIVERSITY OF MALAYA

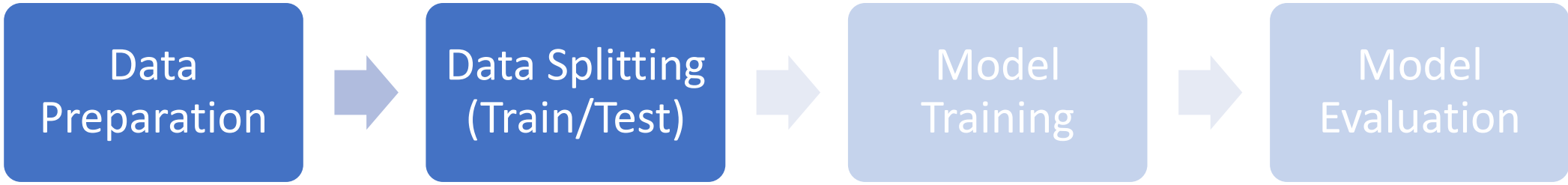
Machine Learning Pipeline



Data	Outlook	Humidity	Windy	Label
Data1	Sunny	High	False	Cold
Data2	Overcast	Normal	True	Hot
Data3	Rainy	High	False	Hot
…	…	…		…
DataN	Rainy	Normal	False	Cold

UNIVERSITY OF MALAYA

Machine Learning Pipeline



70% Training

30% Test

Data	Outlook	Humidity	Windy	Label
Data1	Sunny	High	False	Cold
Data2	Overcast	Normal	True	Hot
Data3	Rainy	High	False	Hot
…	…	…		…
DataN	Rainy	Normal	False	Cold

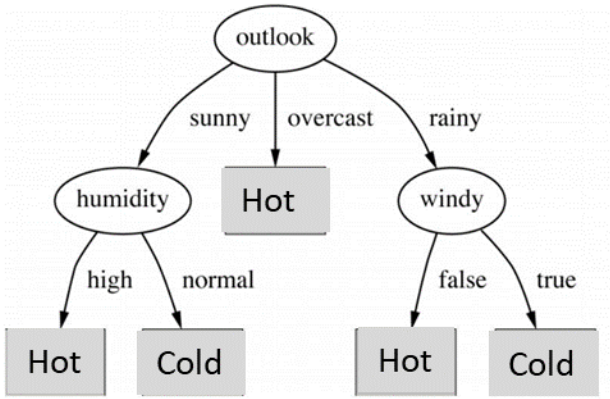
UNIVERSITY OF MALAYA

Machine Learning Pipeline

Data Preparation → Data Splitting (Train/Test) → Model Training → Model Evaluation

70% Training

Data	Outlook	Humidity	Windy	Label	Prediction
Data1	Sunny	High	False	Cold	Cold
Data2	Overcast	Normal	True	Hot	Hot
Data3	Rainy	High	False	Hot	Hot
…	…	…		…	
DataN	Rainy	Normal	False	Cold	



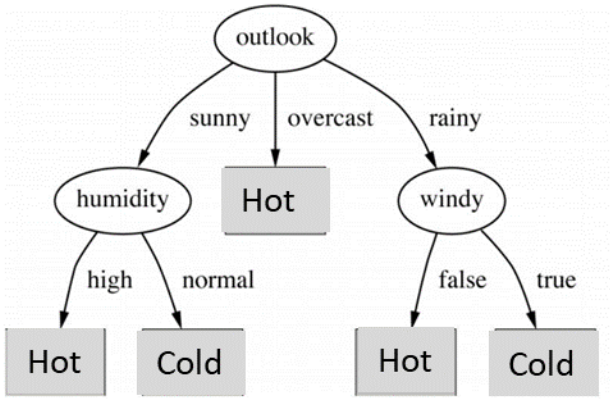
UNIVERSITY OF MALAYA

Machine Learning Pipeline

Data Preparation → Data Splitting (Train/Test) → Model Training → Model Evaluation

Data	Outlook	Humidity	Windy	Label	Prediction
Data1	Sunny	High	False	Cold	Cold
Data2	Overcast	Normal	True	Hot	Hot
Data3	Rainy	High	False	Hot	Hot
…	…	…		…	
DataN	Rainy	Normal	False	Cold	Hot

30% Test

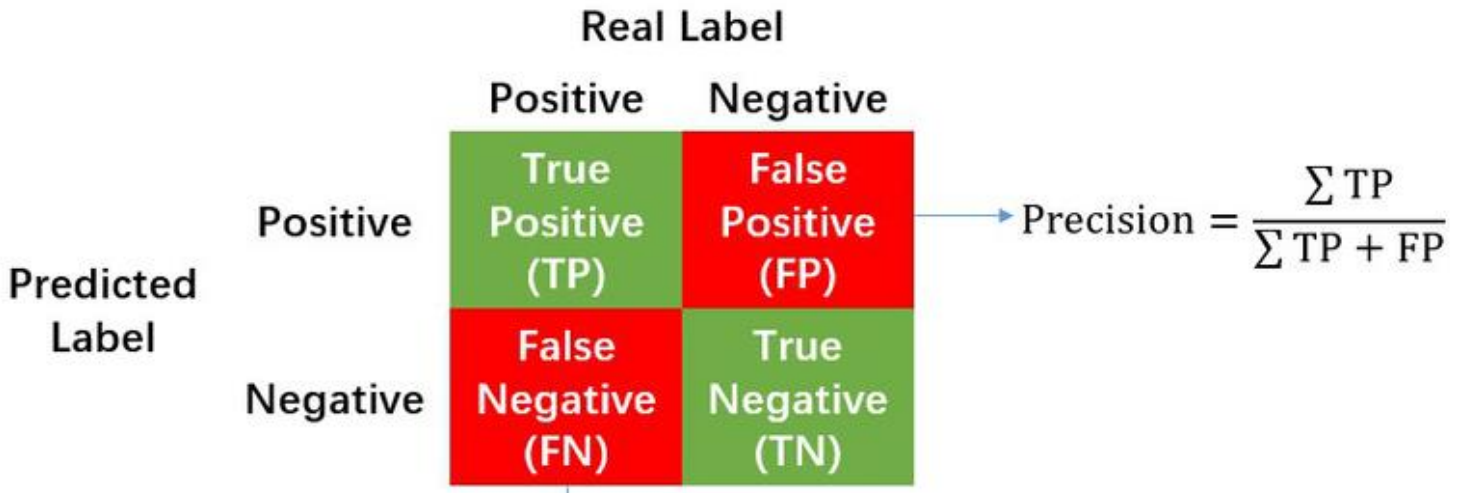


UNIVERSITY OF MALAYA

Model Evaluation

A perfect model should predict all testing data correctly

→ **Accuracy** = 100% (the higher the better)



UNIVERSITY OF MALAYA

Hands-on Python Workshop

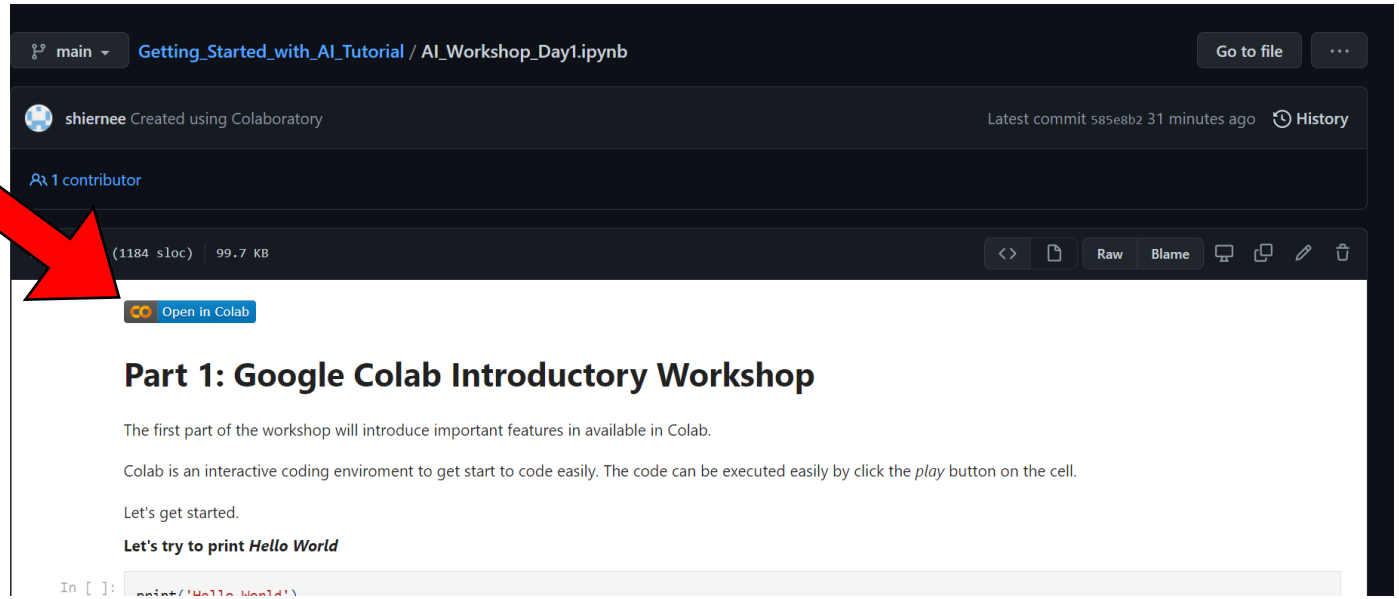
Course Materials

1. Please go to this link. We will go through the code here.

https://github.com/shiernee/2024_ACOMP_WORKSHOP/blob/main/2024ACOMP_AI_Workshop.ipynb

2. Click “Open in Colab”

3. Save a copy in your drive.
- File
- Save a copy in Drive



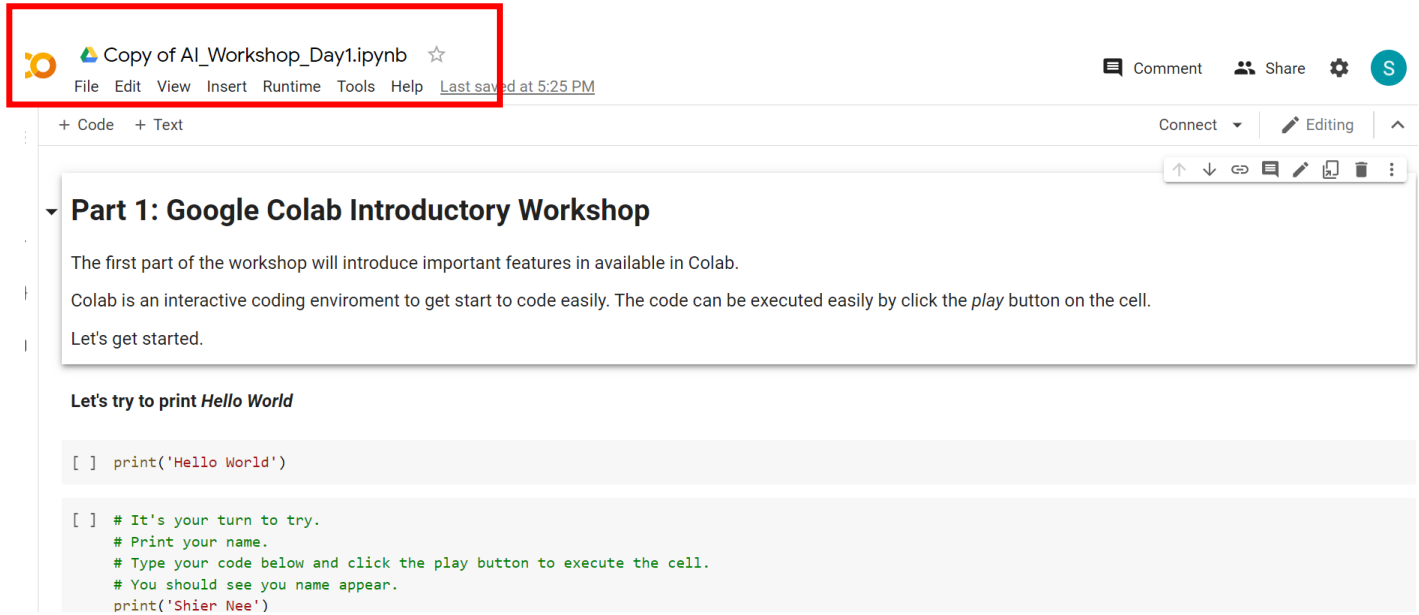
Google Colab

1. Please go to this link. We will go through the code here.

https://github.com/shiernee/2024_ACOMP_WORKSHOP/blob/main/2024ACOMP_AI_Workshop.ipynb

2. Click “Open in Colab”

3. Save a copy in your drive.
- File
- Save a copy in Drive
- You should see the name change to “Copy of AI_Workshop_Day1.ipynb”



Classification

1. To try with your datasets. Replace the datasets to your datasets for
   - X, y

```
from sklearn import svm

breast_data = datasets.load_breast_cancer()
X = breast_data.data
y = breast_data.target
```

Day 1 Conclude

1. Artificial Intelligence Overview
2. Classification Concept
3. Hands-on Python Workshop

https://docs.google.com/forms/d/e/1FAIpQLSejvj7aNFcmcpDjV8Vk1uYKDgRxhQeJHHSZlN3P_JLtrCbaQ/viewform

Feedback

Link -

https://docs.google.com/forms/d/e/1FAIpQLSejvj7aNFcmcpDjV8vlk1uYKDgRybQoJHHSZlN3P_JLtrCbaQ/viewform

Additional Info

1. K-fold cross validation - https://machinelearningmastery.com/k-fold-cross-validation/
2. Hyperparameter Tuning – https://machinelearningmastery.com/hyperparameter-optimization-with-random-search-and-grid-search/
3. AutoML Framework - https://nbviewer.org/github/pycaret/pycaret/blob/master/tutorials/Binary%20Classification%20Tutorial%20Level%20Beginner%20-%20%20CLF101.ipynb