

- Briefly explain whether Machine Learning can be applied to the following tasks. If so explain which class of machine learning models can be exploited in few lines. a) finger-print based login, b) generating annual sales report, c) guessing future sales of a company, d) detecting patients with similar disease symptoms, e) cleaning data in large database, f) converting image to text, g) compressing photos and h) preparing a good presentation.
- Can the Machine Learning approaches be considered as optimization problems? If so explain why and if not, what are the differences between traditional optimization problems and Machine Learning?
- Explain the situations where polynomial regression can be applied for a prediction problem. What are the pros and cons of polynomial regression comparing to linear regression?
- In a character recognition dataset, three machine learning models achieves the following performance.

Model Name	Training accuracy	Testing accuracy
Model A	90%	80%
Model B	95%	60%
Model C	60%	50%

Explain the following, a) which model is over-fitting the dataset b) which model is under-fitting the dataset and c) which is the better model among three?

- In a medical dataset, three Neural Network models with different complexities shows the following performance.

Model Name	Model Complexity (No. of parameters)	Accuracy
Model A	50 params	90%
Model B	120 params	95%
Model C	150 params	96%

Explain the following a) which model will be better when considering the risk factor of the classification outcome? b) which model is better for faster speed requirements? c) which model can balance the speed and accuracy tradeoff well?

- Explain the following: a) Gradient descent, b) Learning rate, c) Activation function, d) Reinforcement Learning.