

## Lecture: 03) Exercise 1

**Think about some possible binary classification, multi-class classification and regression tasks. What hypothesis spaces can be considered?**

- **Binary classification** tasks involve predicting one of two possible outcomes, such as determining whether an email is spam or not spam. Common hypothesis spaces for binary classification include logistic regression, decision trees, and support vector machines (SVMs).
- **Multi-class classification** tasks involve predicting one of multiple possible outcomes, such as determining the breed of a cat in a picture. Common hypothesis spaces for multi-class classification include decision trees, SVMs, and neural networks.
- **Regression** tasks involve predicting a continuous value, such as predicting the price of a house based on its square footage. Common hypothesis spaces for regression include linear regression, polynomial regression, and decision trees.

Here are some examples of binary classification tasks along with the possible hypothesis spaces that can be considered:

1. Identifying whether an email is spam or not spam. Hypothesis spaces that can be considered include logistic regression, decision trees, and support vector machines (SVMs).
2. Determining whether a company is likely to default on a loan based on their credit score and annual earnings. Hypothesis spaces that can be considered include decision trees, random forests and neural networks.
3. Classifying images as either a "boy" or "not a boy". Hypothesis spaces that can be considered include convolutional neural networks (CNNs) and support vector machines (SVMs)

Examples of multi-class classification tasks along with the possible hypothesis spaces that can be considered:

1. Identifying the breed of a cat based on an image. Hypothesis spaces that can be considered include deep neural networks (DNNs) and convolutional neural networks (CNNs)
2. Recognizing handwritten digits (0-9). Hypothesis spaces that can be considered include deep neural networks (DNNs) and convolutional neural networks (CNNs)
3. Identifying the type of vegetables (garlic, ginger, onion) based on an image. Hypothesis spaces that can be considered include deep neural networks (DNNs) and convolutional neural networks (CNNs)

Examples of regression tasks along with the possible hypothesis spaces that can be considered:

1. Predicting the price of an apartment based on its size of area, number of rooms, and location. Hypothesis spaces that can be considered include linear regression, polynomial regression, and decision trees.
2. Forecasting stock prices based on historical data. Hypothesis spaces that can be considered include time-series models such as ARIMA and LSTM.
3. Predicting the number of units of a product that will be sold in a given month. Hypothesis spaces that can be considered include linear regression and time-series models.