Hypothesis Space

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What is hypothesis in machine learning?

- It is a candidate model that approximates a target function for mapping inputs predictor map h(x) to outputs predicted label y-hat.
- Predictor functions, those could “approximate an unknow target function that can best map inputs to outputs on all possible observations from the problem domain.”

Sources:

1. CS-EJ3211 Machine Learning with Python, Aalto University

2. Start Machine Learning, Jason Brownlee, https://machinelearningmastery.com/what-is-a-hypothesis-in-machine-learning/

What is the space?

“The space of possible hypothesis that the model may represent is defined by the choice of algorithm and the configuration of the algorithm.

The choice of algorithm could be, for example,

- neural network

The configuration of the algorithm, for example,

- network topology and hyperparameters”

The concept of hypothesis space

Uppercase-h (H) represents the hypothesis space,

- ‘H’ is a hypothesis set. One of the key problem of machine learning is to find a space of possible hypotheses for mapping inputs h(x), so that the predicted label y-hat as close as possible with the true label y at each data point.
- “It is often constrained by the choice of the framing of the problem, the choice of model and the choice of model configuration. “ For example, “we have to restrict the set of the maps that we consider if the set of real value mappings is too large to manage. Therefore, we need to restrict the machine learning method to a subset ‘H’ of all possibility mappings. This subset ‘H’ refers to the hypothesis space in machine learning literature.”

What hypothesis space should be…

- “Sufficiently small to fit the resources

- Sufficiently large, so that we could find the good hypothesis and the predicted label is approximated to the true label.”

Examples of Hypothesis Space

- Linear predictors
- Degree 3 Polyn. Predictors
- Decision trees predictors
- Artificial neural networks