Assign 3

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Thought Question 1

Chapter 8
Subsection 8.1

Question

Models may not only suffer from overfitting; they can also suffer from underfitting. How do we reduce these two common phenomena?

Solution

Overfitting: There are more methods but those generally apply to deep learning models which I learnt in the Deep Learning Course in the last semester. So I feel the below list are good enough for the current Simple Supervised learning models we are learning.

- Regularization
- Cross Validation
- Gather More data
- Early Stopping

Similarly for Underfitting

- Remove unwanted noise from the data
- Increase the model complexity(Mostly this is applicable in Neural Networks)
- Increase the number of features
- Increase the Epochs

Thought Question 2

Chapter 7
Subsection 7.4

Question

I was thinking about the types of regression and I noticed that we have two types well linear and Non- Linear ie (Polynomial but when they are all monomials it becomes Linear), but I was wondering if there exists regression models which are non linear like say $f(x) = a\sin(x) + e^x$.

Solution

I would assume the answer is yes that certain problems would require non linear models as functions like the exponential functions, logarithmic functions, trigonometric functions, power functions or so on. Maybe if we

Another issue with such non-linear models is the fact that there is no closed form expression like the linear model. Again in contrast to linear regression, there may be many local minima of the function to be optimized and even the global minimum may produce a biased estimate.

I feel like maybe using taylor expansion of these series we could end up getting a closed form solution approximately but not really sure.