HW5

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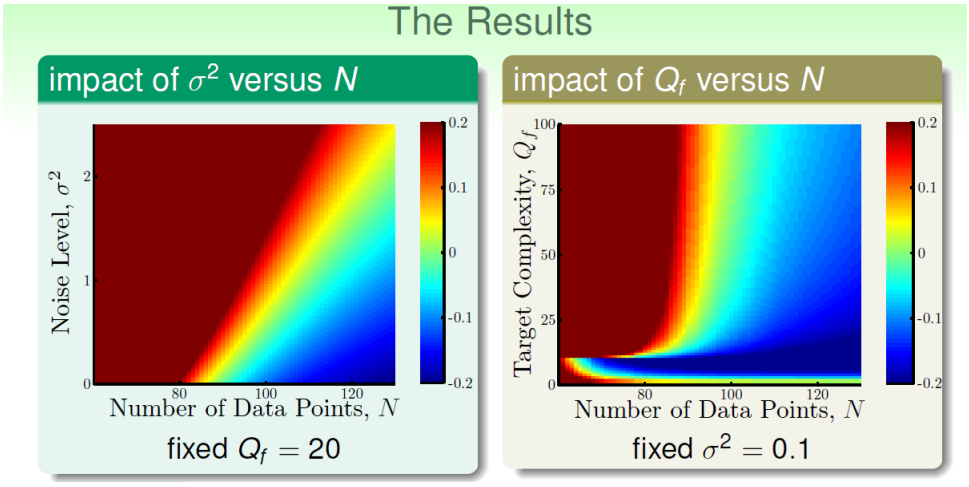
Abstract

This document contains my attempt at the homework 5 problems of the course Learning From Data (**CS156**) as taught by Professor *Yaser Abu-Mostafa, Caltech.*

- **Overfitting and Deterministic Noise**

1.[b]



Regularization with Weight Decay

2.[b], the in-sample error comes close to 0.08 whereas the out-of-sample error turns out be

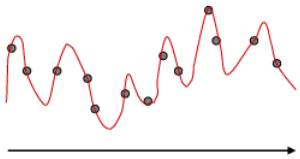
Regularization

– The minimization

$$\min_f |Y_i - f(X_i)|^2$$

may be attained with zero errors.

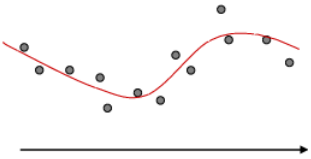
But the function may not be unique.



– Regularization

$$\min_{f \in H} \sum_{i=1}^{n} |Y_i - f(X_i)|^2 + \lambda \|f\|_H^2$$

- Regularization with smoothness penalty is preferred for uniqueness and smoothness.
- Link with some RKHS norm and smoothness is discussed in Sec. IV.



0.528

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3.[a], values come out to be 0.0074573662171520110.2787994598418299

Regularization for Polynomials

4.[e]

5.[d], by using different values of k in the regualrizer it can be obtained

6.[b], at $k = -1, 0.06$ value of out-sample error is acheived

7.[c], the first Hypothesis will give $\mathcal{H}2$ and second one will give $\mathcal{H}3$ and hence intersection of both will be $\mathcal{H}2$

Neural Networks

8.[d]

9.[a]

10.[e]