REPORT : Support Vector Machines

Kernels vs Accuracy, Time

Kernel	Time(in seconds for 5 cross fold verifications)	Accuracy
Linear	3.8	83.67
Polynomial for degree 3	12.11	85.4
Gaussian	16.68	84.43
Multiple Kernels	52.43	85.78

Inferences:

- Polynomial takes very high time for higher degrees, but gives maximum accuracy for a single kernel.
- Linear is a good balance between time and accuracy.
- Using Mulitple kernels take significantly high time but gives maximum accuracy.

Polynomial

Degree	Time(in seconds for 5 cross fold verifications)	Accuracy
1	10.56	84.07
2	10.93	85.5
3	12.11	85.38
4	17.85	85.19
5	37.42	84.44
6	114.67	83.75

We can observe that it increases, maximizes at degree 4 and decreases.

Gaussian

sigma	Time (in seconds for 5 cross fold verifications)	Accuracy
0.1	20.02	79.7
0.2	19.04	82.88
0.3	18.30	83.76
0.4	17.43	84.44
0.5	16.88	84.75
0.6	16.97	84.63
0.7	17.01	84.50
0.8	16.81	84.38
0.9	16.74	84.32

We can observe that it increases, maximizes at 0.4 and then decreases.

Multi Kernel Fixed rules

For fixed rule , weight given by me(guessed according to accuracy) were:

1) Linear : 0.25
2) Polynomial: 0.6
3) Gaussian: 0.15

The training time is 10.12 seconds.

Multi Kernel Heuristics

The weights obtained after heuristic analysis is:
[0.37951012851875671, 0.32827515118575679, 0.29221472029548662]
For linear , polynomial and gaussian kernel respectively.
The training time is 14.35 seconds.