Semi-Supervised Learning and Domain Adaptation in Natural Language Processing

5 Learning under Unknown Bias

5.1 Adversarial learning

5.2ensemble-based methods and meta-learning

肖 麗穎

- The assumption that a large pool of unlabeed data is available from a relatively homogeneous target domain holds only if the target domain is known in advance, but in fact, it’s usually not.
- A brief introduction to ensemble learning and meta-learning, which are orthogonal approaches to the robust learning problem

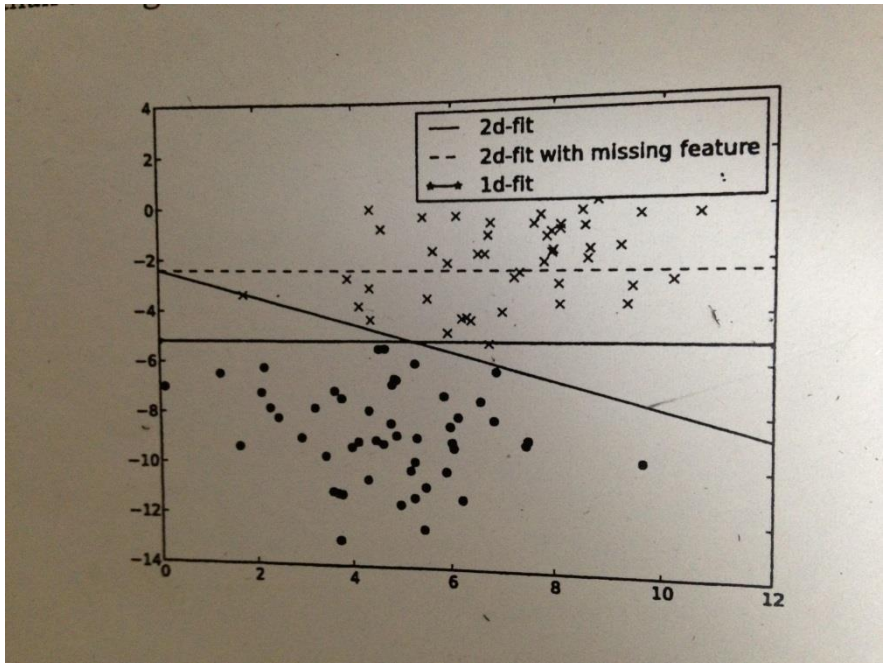
Adversarial learning

- Spelling expansion: *coz* and *because.*
- Correlation analysis: *bat* and *puck.*
- →these techniques being far from perfect, cannot solve the problem completely.
- OOV effects(out-of vocabulary effects)

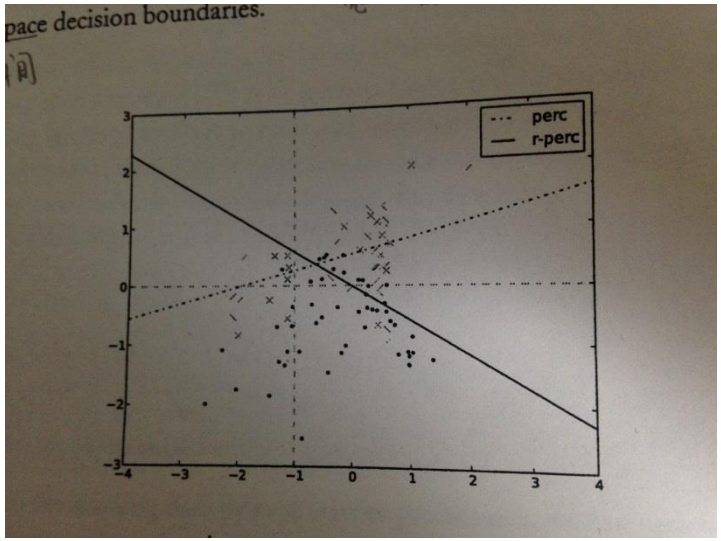
The sudden absence of known indicative features may hurt performance considerably.

y	x1	x2	x3
1	1	0	0
0	0	1	0
1	1	0	1
1	0	0	1

In this example features x1 an x3 are supposed to be indicative os positive class, while the feature x2 is indicative of negative class.



Optimal decision boundary is not optimal when one dimension is removed.



Adversarial for perceptron on artificial data.

	POS	EP	Mate
EWT-Answers	3.1%	2.4%	0.8%
EWT-Newsgroups	3.3%	1.6%	0.2%
EWT-Reviews	2.8%	0.3%	1.1%
EWT-Weblogs	4.7%	-0.3%	0.4%

For cross-domain document classification.
Adversarial learning error reductions on POS tagging and dependency parsing

Ensemble-based methods

- The simplest form: **voting**.
- Another form(similar in spirit to weighted voting): **product of experts**.
- **Stacking**: where multiple weak classifiers are combined in strong end classifier.

Meta-learning

- We try to learn what input classifiers to trust on a given data point.
- It seems to learn when to trust the perceptron and when to trust the nearest neighbor rule.