FIRST-PERSON NARRATIVE SENTIMENT CLASSIFICATION

Computational Content Analysis Week-3 Coding

Presenter: Linghui Wu

INTRODUCTION

- Reed, Lena, Jiaqi Wu, Shereen Oraby, Pranav Anand, and Marilyn Walker. "**Learning lexico-functional patterns for first-person affect.**" *arXiv preprint arXiv:1708.09789* (2017).
- People blogging about their day
  - NOT explicitly flag their affective state: *I am happy.*
  - INSTEAD describe situations that readers can readily infer: *My friend brought me flowers.*

DATA

- First-person narratives from **Spinn3r corpus**
- 15466 stories range from 225 to 375 words
- Mechanical Turkers annotated 2k random sentences
  - 498 positive
  - 754 negative

SETUP

- Tokenize and normalize text data
- Turn into tf-idf matrix and vectorize text data

```
train_data_df.sample(5)
```

	sentence	category	tokenized	normalized	vect
1078	Our regular insurance doesn't pay that.	0	[Our, regular, insurance, does, n't, pay, that]	[regular, insurance, pay]	[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...
1018	We finally were able to send more Democrats to...	0	[We, finally, were, able, to, send, more, Demo...	[finally, able, send, democrat, congress]	[0.0, 0.0, 0.0, 0.0, 0.0, 0.46784345097009256,...
900	I'm just going to wait until they break up (if...	0	[I, 'm, just, going, to, wait, until, they, br...	[be, go, wait, break, fuck, know, give, chance]	[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...
56	I came back home to take a gigantic broken-up ...	1	[I, came, back, home, to, take, a, gigantic, b...	[come, home, gigantic, break, nap, perfect, ra...	[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...
114	I had plans to put my bike in the back of the ...	1	[I, had, plans, to, put, my, bike, in, the, ba...	[plan, bike, kia, bike, home, lot, ingenious, ...	[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...

- Split into training and testing sets

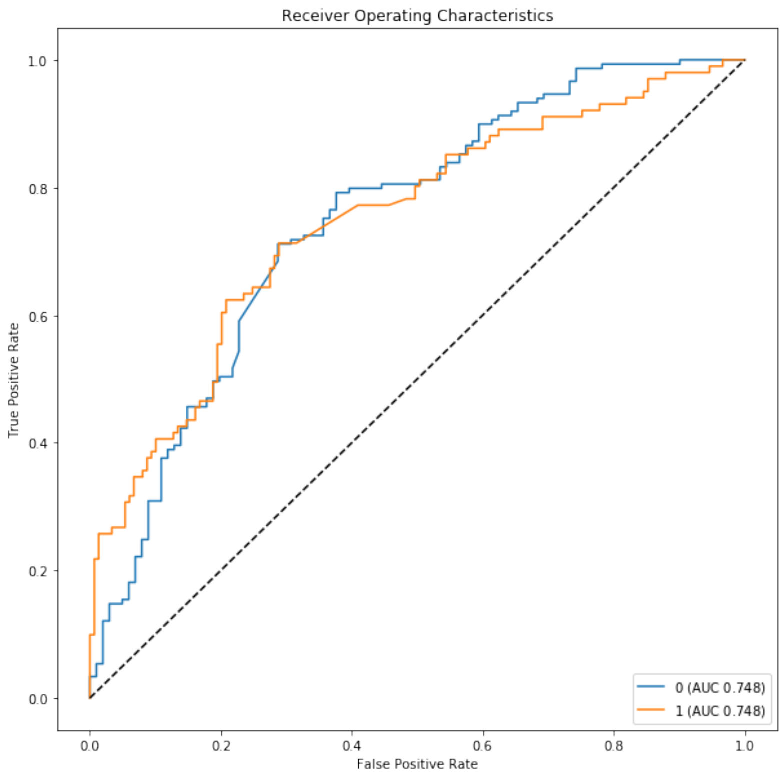
LOGISTIC REGRESSION

- Mean accuracy: 0.823 on train set, 0.648 on test set.

Category	Error Rate	AUC	Precision
0	0.308	0.643	0.684
1	0.308	0.643	0.722

- Extrapolation on uncoded data

	sentence	predict_logistic
2245	I ended up in some part of the Boondocks I've ...	0
1969	We found our seats before the concert started.	0
817	Don't mess with us mann!	0
26	So tonight we finally met.	1
1813	It was a lot of fun (yummy too.)	1



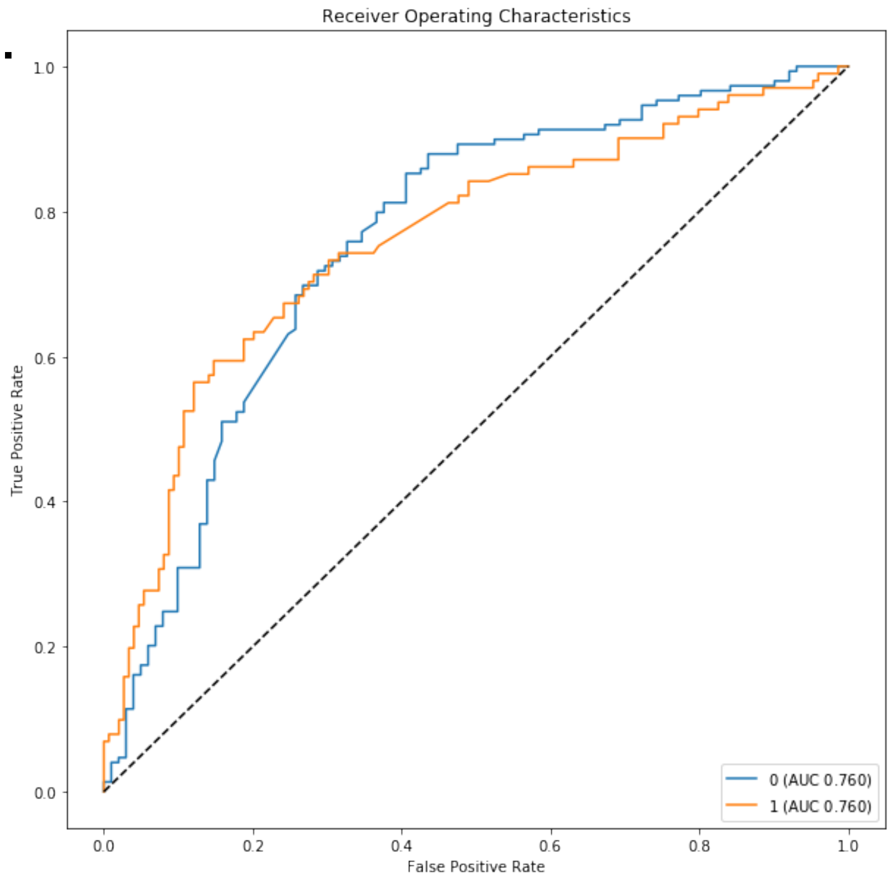
NAÏVE BAYES

- Mean accuracy: 0.867 on train set, 0.732 on test set.

Category	Error Rate	AUC	Precision
0	0.268	0.694	0.723
1	0.268	0.694	0.758

- Extrapolation on uncoded data

	sentence	predict_naive_bayes
1683	She found me roots of relish sweet, And honey...	1
2453	If I didn't sit next to her in English, I woul...	0
946	Today we are celebrating the life of one of So...	1
628	You can imdb it yourselves, the movie is a com...	0
120	I just always liked that quote.	0



COMPARISON

Classifier	Logistic Regression	Naïve Bayes
Training Set Accuracy	0.823	**0.867**
Testing Set Accuracy	0.648	**0.732**
Error Rate	0.308	**0.268**
AUC	0.643	**0.694**

- **Naive Bayes reaches the asymptotic solution for fewer training sets than the Logistic Regression.**
  - Ng, Andrew Y., and Michael I. Jordan. "**On discriminative vs. generative classifiers: A comparison of logistic regression and naive bayes.**" In Advances in neural information processing systems, pp. 841-848. 2002.

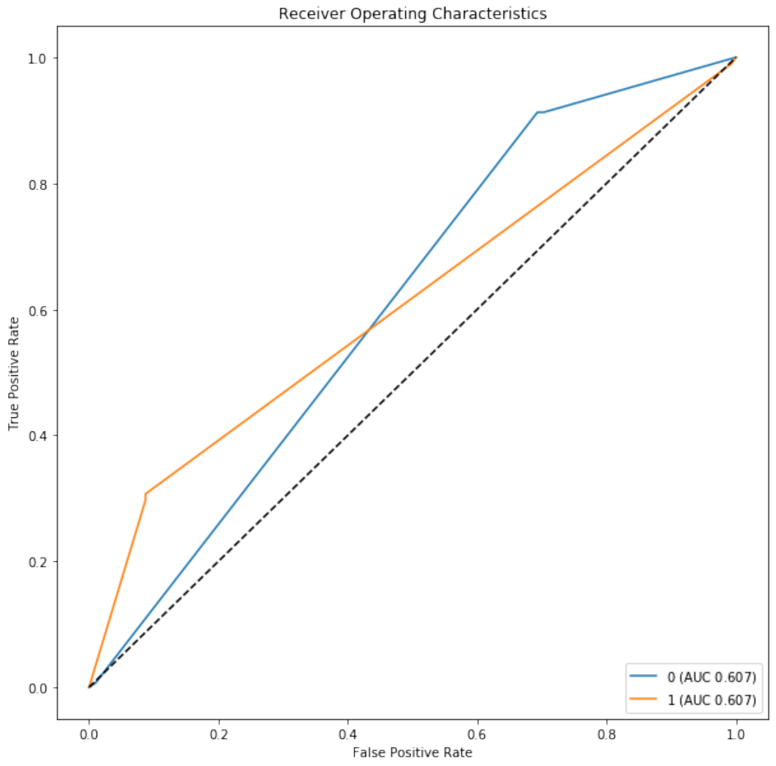
DECISION TREE

- Mean accuracy: 0.801 on train set, 0.624 on test set.

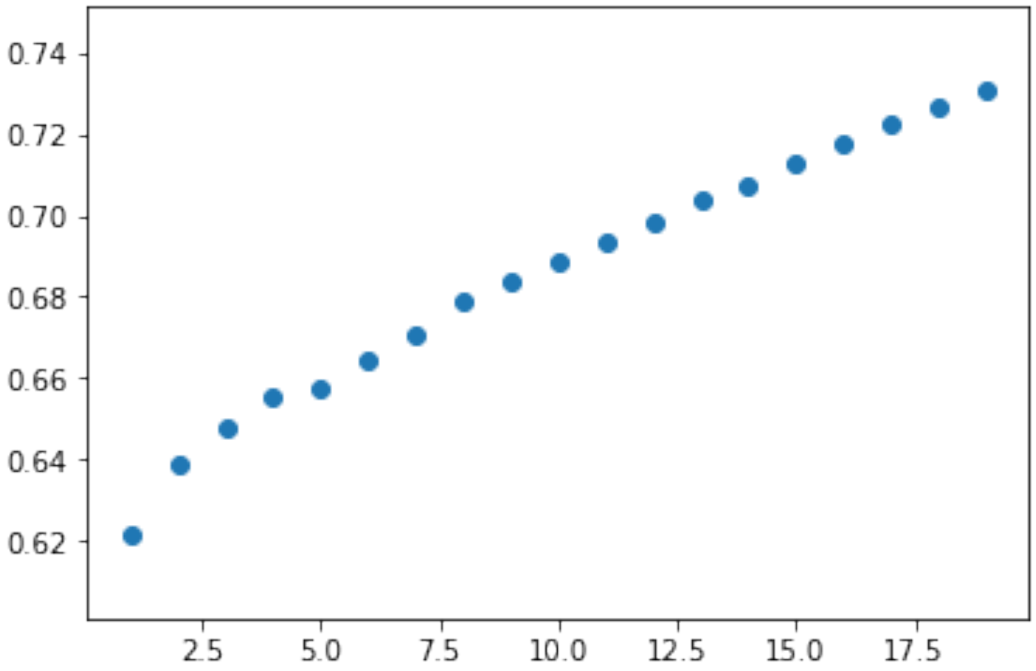
Category	Error_Rate	AUC	Precision
0	0.376	0.591	0.660
1	0.376	0.591	0.757

- Extrapolation on uncoded data

	sentence	predict_decision_tree
1557	School stresses me more than anything.	0
2385	I was able to hike around and try to find a va...	0
856	Today I was happily back at 193 lbs.	0
2123	I think Traci gets off on messing around with ...	1
772	I need it to go away.	1



TRIMMING THE TREE



- **Improvement by bagging different trees?**

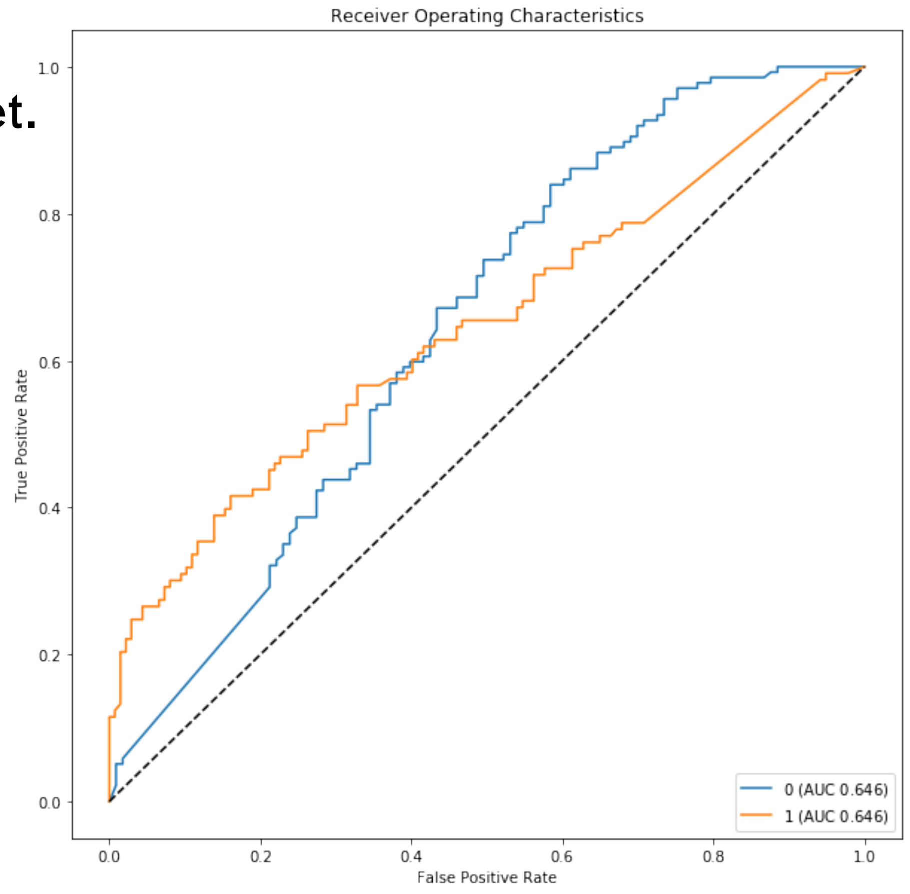
RANDOM FOREST

- Mean accuracy: 0.802 on train set, 0.636 on test set.

Category	Error Rate	AUC	Precision
0	0.364	0.602	0.601
1	0.364	0.606	0.823

- Extrapolate on uncoded data

	sentence	predict_random_forest
2263	So I don't know why he called me Aly.	0
1683	She found me roots of relish sweet, And honey...	1
2422	I meant it when I said it but in actuality it'...	0
1217	Interesting weekend.	0
2104	So im thinking I need to pick up a second job....	1



COMPARISON

Classifier	Decision Tree	Random Forest
Training Set Accuracy	0.801	**0.802**
Testing Set Accuracy	0.624	**0.636**
Error Rate	0.376	**0.364**
AUC	0.591	**0.601**

- Improvement using ensemble methods?
- Yes, but only slightly better!

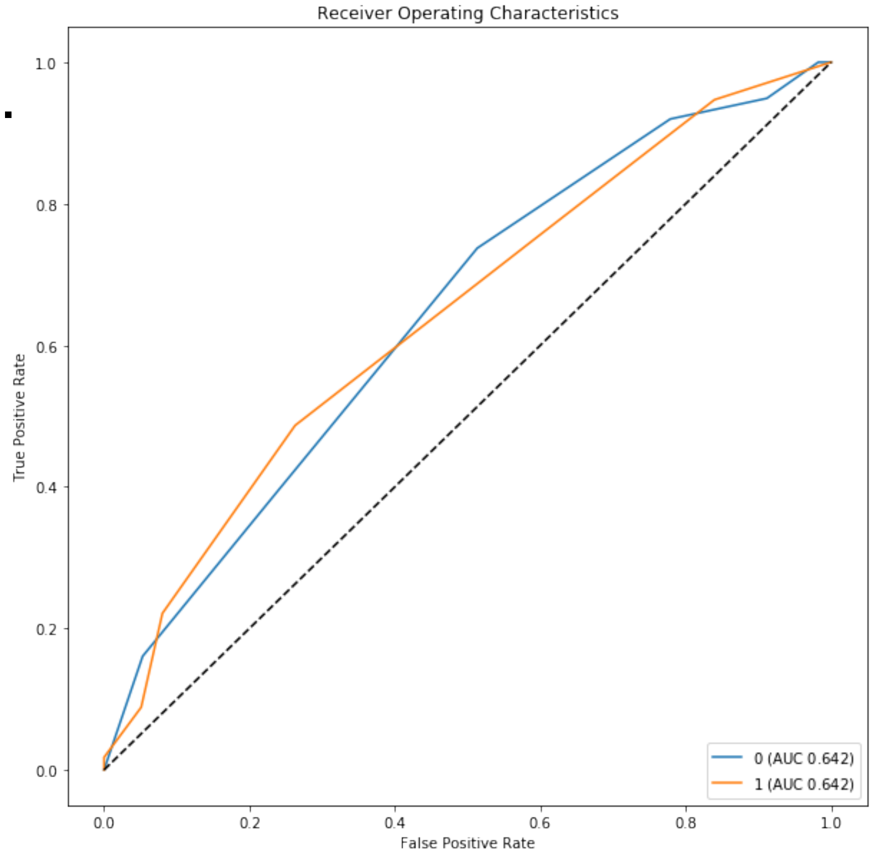
K-NEAREST NEIGHBORS

- Mean accuracy: 0.619 on train set, 0.556 on test set.

Category	Error Rate	AUC	Precision
0	0.444	0.509	0.552
1	0.444	0.509	1.000

- Extrapolate on uncoded data

	sentence	predict_knearest
2582	All in all I've taught or helped to teach mah ...	0
2517	But we've never met	0
641	Score one for me... ?? But I am pretty sure it...	0
2550	like in my title: WAAAAAAAAAAAAAAAAAAAAAAAAAAA...	0
1694	"I was really nervous."	0



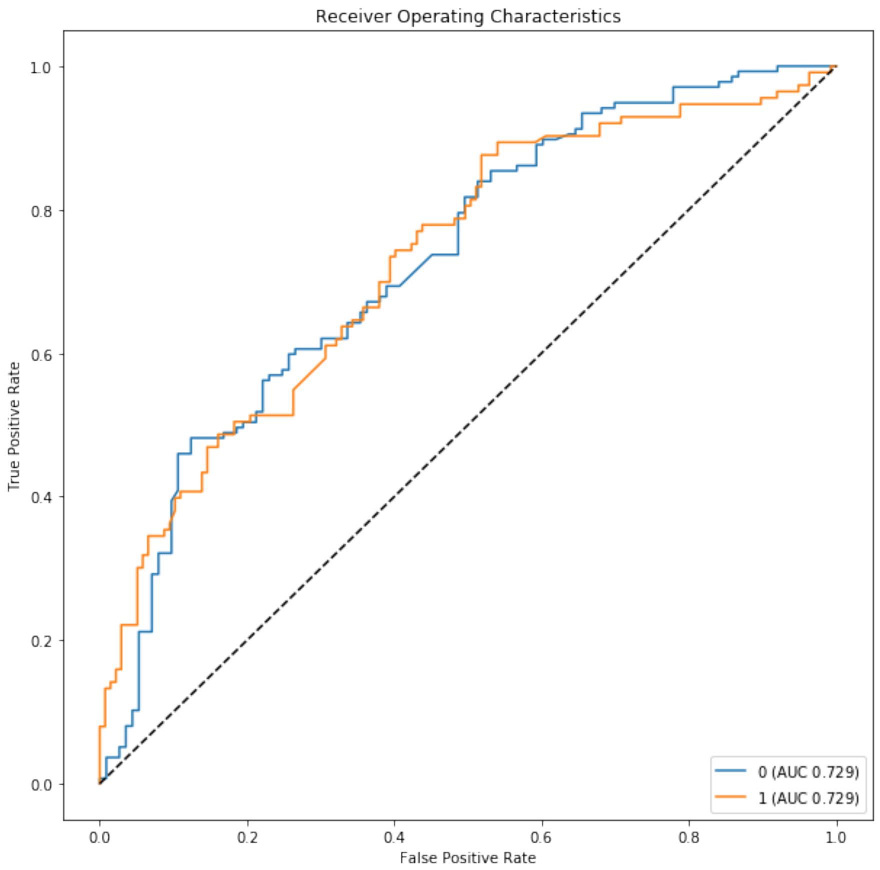
SVM

- Mean accuracy: 0.894 on train set, 0.660 on test set.

Category	Error Rate	AUC	Precision
0	0.340	0.634	0.633
1	0.340	0.634	0.759

- Extrapolate on uncoded data

	sentence	predict_svm
1304	I'd go further into detail on this matter, but...	0
2550	like in my title: WAAAAAAAAAAAAAAAAAAAAAAAAAAA...	0
1277	Hey mom, I know I'm a baby, but I think I know...	0
1947	I was up late last night writing the worst pap...	0
1929	Forgive me.	0



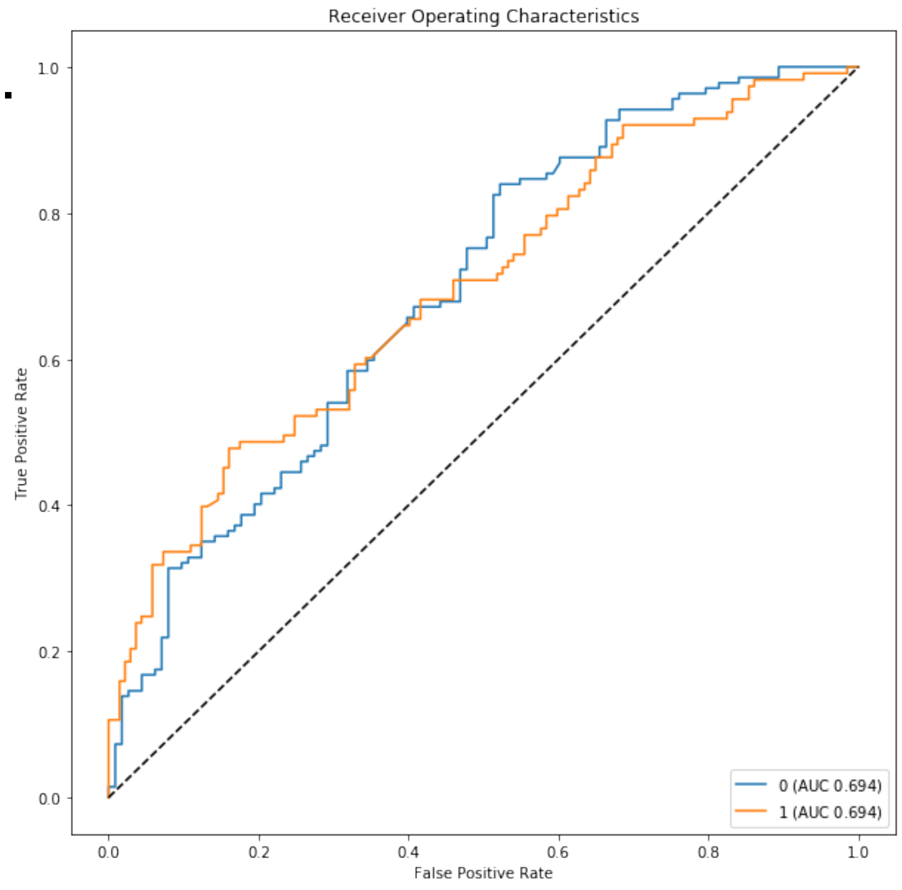
NEURAL NETWORKS

- Mean accuracy: 0.993 on train set, 0.636 on test set.

Category	Error Rate	AUC	Precision
0	0.364	0.624	0.644
1	0.364	0.624	0.622

- Extrapolate on uncoded data

	sentence	predict_neural_net
2190	Again, I couldn't be happier.	1
938	I hate writing negatively about something that...	0
1319	As you may have noticed, I didn't post anythin...	0
953	When we were talking she said she ends up with...	0
415	Other celebrity encounters: I squeezed in a hu...	1



COMPARISON AMONG ALL MODELS

Classifier0.	Logistic Regression	Naïve Bayes	Decision Tree	Random Forest	K-nearest Neighbor	SVM	Neural Networks
Training Set Accuracy	0.823	**0.867**	0.801	0.802	0.619	0.894	**0.993**
Testing Set Accuracy	0.648	**0.732**	0.624	0.636	0.556	0.660	0.636
Error Rate	0.308	**0.268**	0.376	0.364	0.444	0.340	0.364
AUC	0.643	**0.694**	0.591	0.601	0.509	0.634	0.624

- Best algorithm: Naïve Bayes
- Neural Nets: High accuracy in training set but low in testing set -> Overfitting?
- **Still not satisfying results**

ALGORITHMS IN THE PAPER

- Baseline First-Person Classifiers
  - SVM with unigram features
  - NRC-Canada sentiment classifier
  - Stanford Sentiment Classifier
- **AutoSlog First-Person Sentence-Level Classifier**
  - Uses syntactic templates to define linguistic expressions
  - Verb-particle constructions: *cry*
  - Verb-head-of-preposition constructions: *cheated on, care for*

ALGORITHMS IN THE PAPER

	Classifier	Pos F1	Neg F1	Macro F
1	**SVM**	0.66	0.60	0.64
2	**NRC**	0.58	0.69	0.64
3	**Stanford**	0.54	0.73	0.67
4	**AutoSlog (ASlog)**	0.11	0.68	0.53
5	**Retrained Stanford**	0.53	0.73	0.67
6	**NRC, ASlog**	0.60	0.78	0.71
7	**Stanford, ASlog**	0.55	0.76	0.70
8	**NRC, ASlog, Stanford**	0.64	**0.79**	0.74
9	**NRC, ASlog, SVM**	**0.70**	0.78	**0.75**

Table 4: Test Set Results

RESULTS FROM THE PAPER

- AutoSlog enhances the performance of current sentiment classifiers.
- Linguistic functions indicating positivity and negativity are different.
  - Positivity – Active Participation: *head for, …*
  - Negativity – Private State: *need, want, …*

MY CONCLUSIONS

- Larger number of hand-coded data enhances accuracy
- Ensemble methods improves performance
- Consider lexico-functional linguistic patterns

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