# Are You Joking? Deep Learning to Identify Humor

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# Humor is Distinctly Human

Machines do it badly.





If interpreted and generated well, humor could augment user experience.

# Goals: Create a Humor Classifier & Investigate Causes of Humor

1) Humor Classifier

2) What Makes Jokes Funny?

a. Sentiment
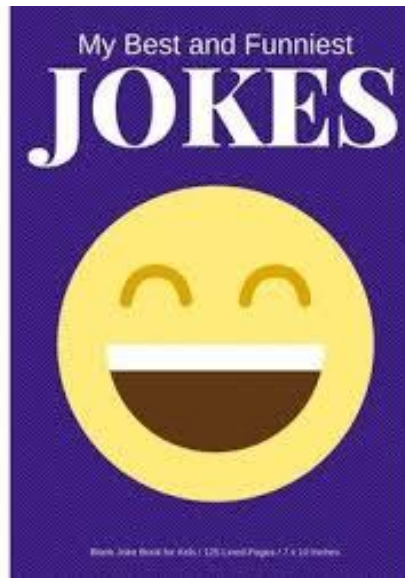b. Unusual Words

# Where did we get our Datasets?

We created first dataset by merging two Kaggle Datasets:
- ~200,000 funny one-liners
- ~200,000 News Headlines compiled by UC Irvine

We applied model to a 2nd Dataset from Kaggle
- ~5000 jokes of different varieties
- Not funny text was ~5000 adages/sayings and Newspaper headlines

# Convolutional Neural Networks Classify Humor Accurately



| Model | Accuracy |
|---|---|
| Logistic Regression, L2 Regularization | 0.8160 |
| Base CNN: embedding_dim = 300, filters = [3,4,5], fiter_number = 100, Adam_Optimizer, Learning_Rate = 0.01, dropout = 1.0 | 0.9645 |
| **Final CNN**: embedding_dim = 300, filters = [3,4,5], fiter_number = 100, Adam_Optimizer, Learning_Rate = 0.0001, dropout = 0.5 | **0.9820** |
| Final CNN + pre-trained GloVe embeddings (not trained in CNN) | 0.9266 |
| Final CNN + pre-trained GloVe embeddings (trained in CNN) | 0.9469 |

# Final Model Error Analysis :

| Category | Joke Text |
| --- | --- |
| True Negative | Older women are most vulnerable to cervical cancer |
| True Positive | I tried using self deprecating humor but i'm not any good at it. |
| False Negative | What was spiderman's major in college? Web design |
| False Positive | So it turns out that dinosaurs were neither warm nor cold blooded |

Some False Negatives are not funny:
Bioluminescent Fry said to have a Bright Future

Some False Positives are very funny (subjective!):
Julia Roberts Confronts the Dog that's Afraid of her Face

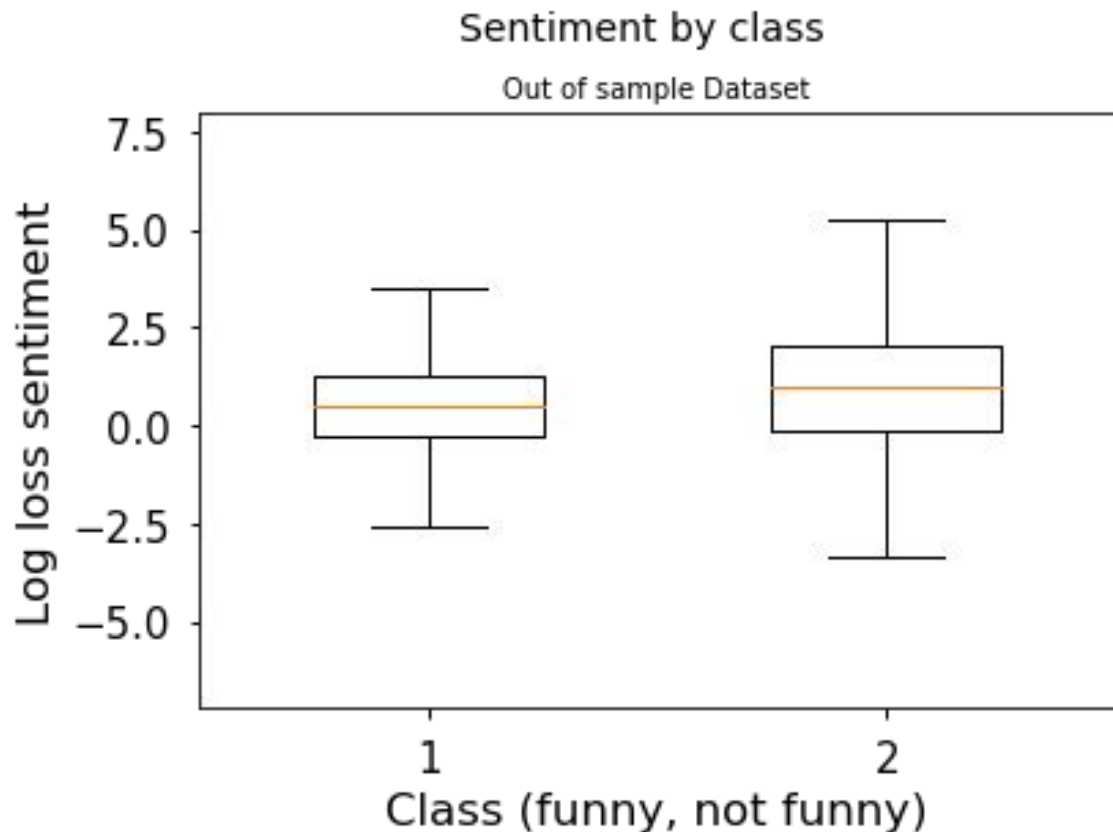# Does a Particular Sentiment Cause Humor?

Does  =  ?

or Does  =  ?

# Average Sentiment *Does Not* Correlate with Humor



Sentiment by class

Out of sample Dataset

# Sentiment Classification

| Joke Text | Log Loss Sentiment | Result |
|---|---|---|
| "shotgun weddings : a wife or death situation." | -3.14 | TP |
| "health advice: the more birthdays you have, the longer you live. guaranteed." | +4.30 | TN |
| "ignoranus: an ignorant butthole." | -5.71 | TN |
| "i'd kill for a nobel peace prize" | +3.78 | FP |

# Do Unusual Words Cause Humor?

Does    'Madam'  =  😂

But    'Lady'  =  😐  ?

# How we Created A "Frequency Thesaurus"

1) Synsets from Wordnet

2) Derived Frequency for each Synset from Brown and Reuter's corpuses

Synonyms for each word in vocab

```
'knock': {'bang',
 'bash',
 'belt',
 'bump',
 'criticise',
 'criticize',
 'knock',
 'knocking',
 'pick_apart',
 'ping',
 'pink',
 'rap',
 'roast'...}
```

Word frequency from Corpuses

```
{'the': 139248,
 'fulton': 17,
 'county': 252,
 'grand': 67,
 'jury': 73,
 'said': 27344,
 'friday': 375,
 'an': 8297,
 'investigation': 104,
 'of': 73191...}
```

Replace each word in dataset with most common synonym

```
{'<UNK>': '<UNK>',
 'the': 'the',
 'doorbell': 'bell',
 'and': 'and',
 'run': 'work',
 'he': 'he',
 'that': 'that',
 'discovered': 'see',
 'scream': 'call',
 'same': 'like',
 'way': 'way',
 'whether': 'whether',
 'devoured': 'down'...}
```

# Replacing Unusual Word was not Fruitful

- ○ _Pre-Transformation_: a cement mixer collided with a prison van. people are warned to be on the lookout for 15 hardened criminals
- ○ _Post-Transformation_: a cement social jar with a prison van. people be discourage to be on the outlook for 15 set criminals.

| Dataset scored with Final CNN | Accuracy |
|---|---|
| Second dataset | 0.7858 |
| Second dataset, least frequent word replaced with most frequent synonym | 0.7858 |
| Second dataset, all possible words replaced with most frequent synonym | 0.7514 |

# What Next?

- ○ Human-verified labeling of humor
  - ■ Binary or continuous response variable
- ○ Measure sentiment contrast within a given document
  - ■ Semantic difference (cosine distance between word embeddings)
- ○ Retain more English meaning
  - ■ Use POS tagging in synonym replacement

# Questions?

- https://github.com/mmstevenson/are_you_joking