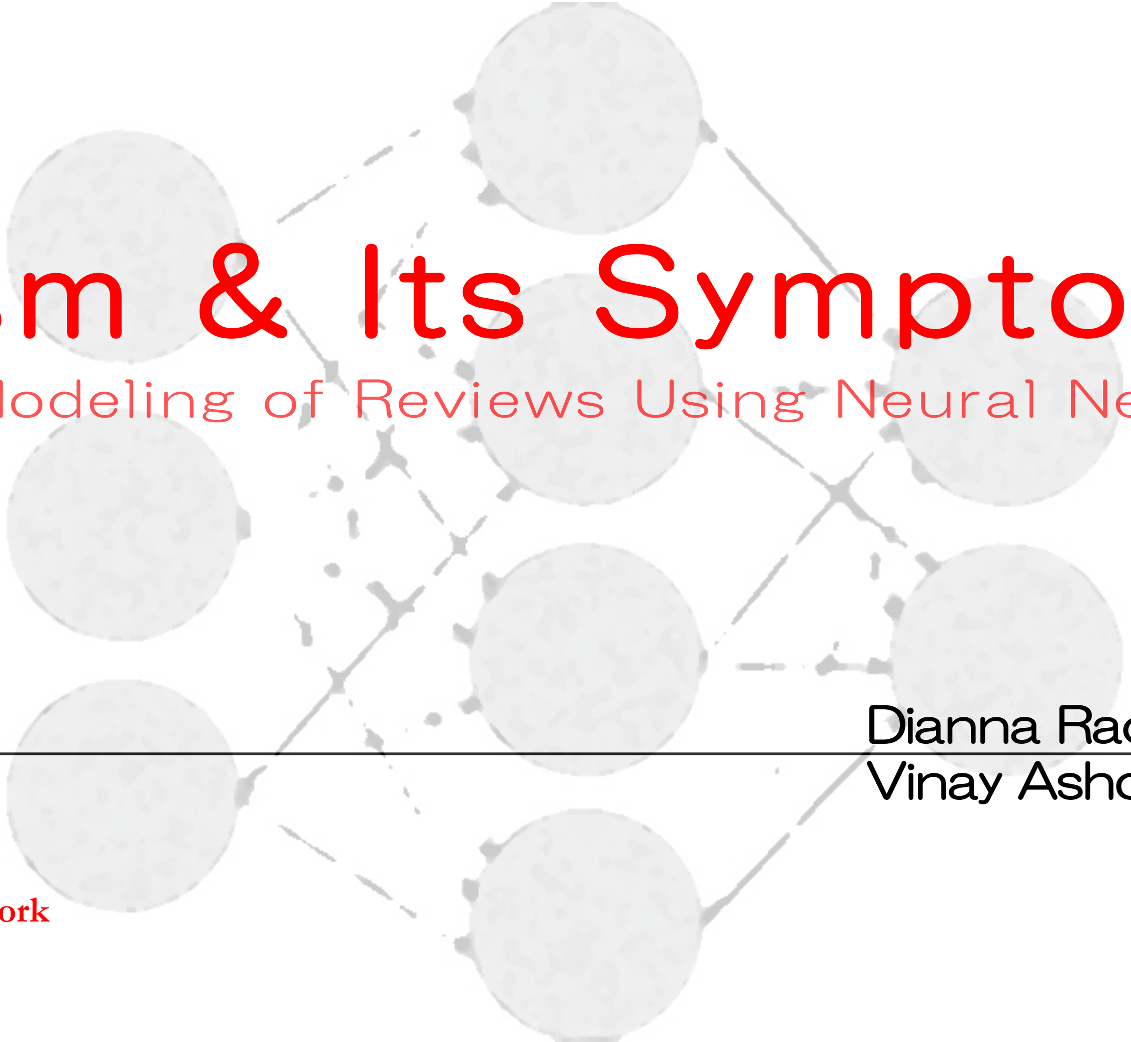
Sarcasm & Its Symptoms

Rating Based Modeling of Reviews Using Neural Networks



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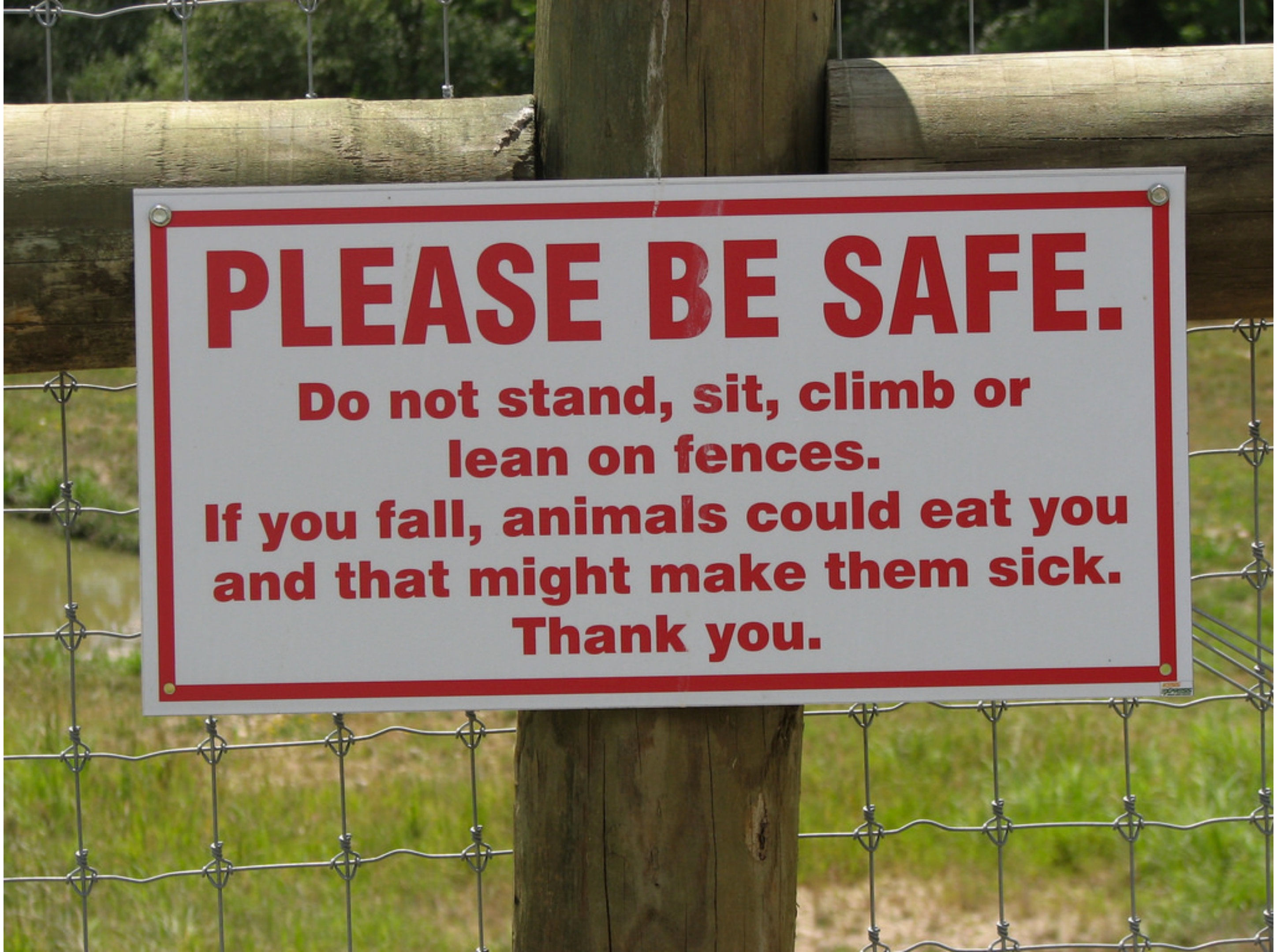
Aim: Sarcasm detection using deep learning

○ a method of classifying sarcastic text on a purely non-contextual basis, i.e. inferences and through only impromptu presence of the text and features



PLEASE BE SAFE.

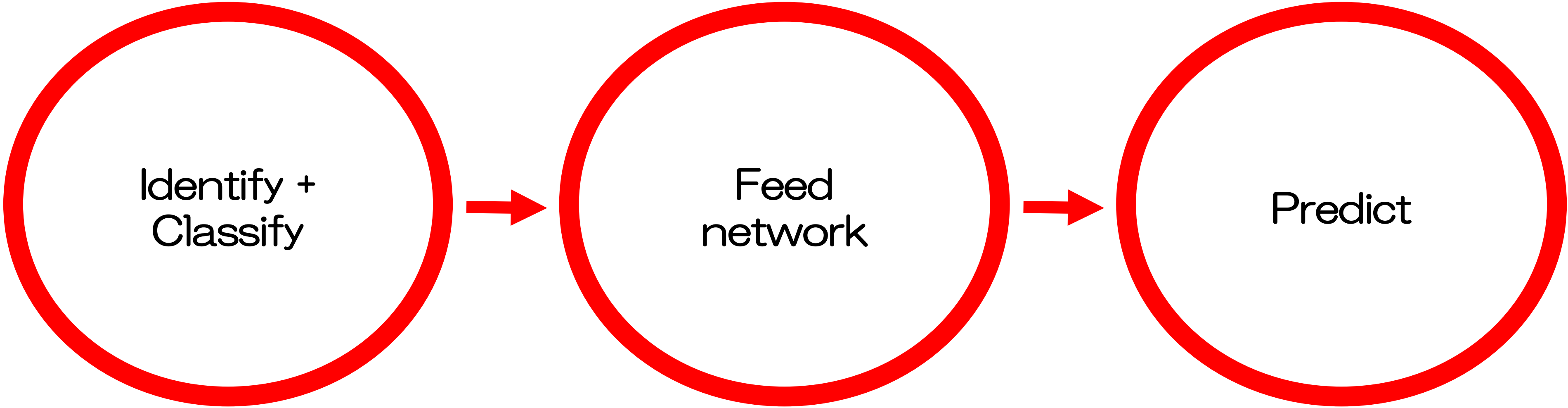
Do not stand, sit, climb or
lean on fences.
If you fall, animals could eat you
and that might make them sick.
Thank you.

Relevant Queries

- Are users more likely to be more or less sarcastic during the holiday season?

- Does higher usage of exclamation points indicate a sarcastic review?

- Do businesses with lower ratings tend to have more sarcastic reviews?

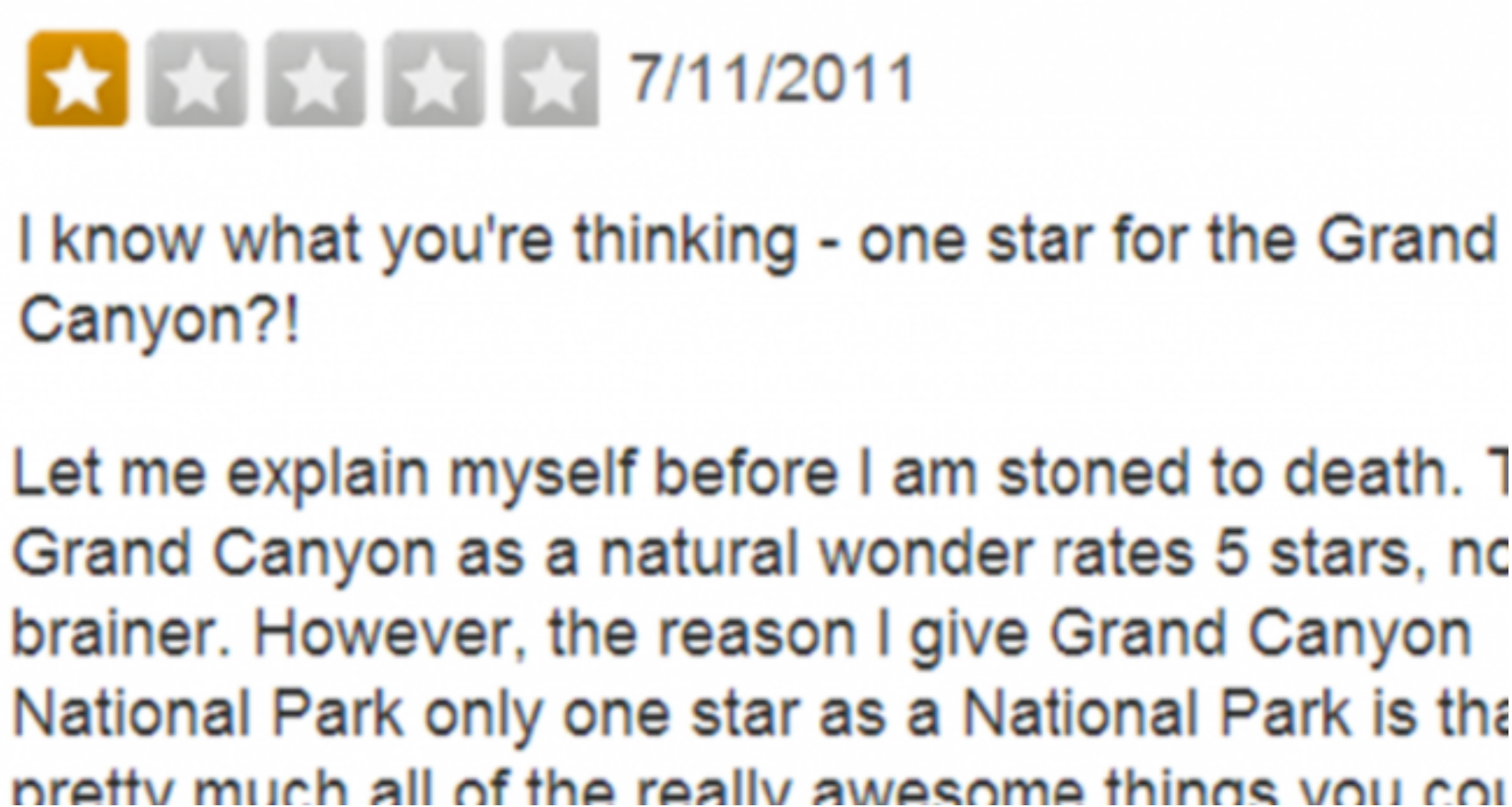


Identify + Classify

Feed network

Predict

Identification, i.e. sarcasm detection, is one of the most challenging aspects of sentiment analysis.



★☆☆☆☆ 7/11/2011

I know what you're thinking - one star for the Grand Canyon?!

Let me explain myself before I am stoned to death. T
Grand Canyon as a natural wonder rates 5 stars, nc
brainer. However, the reason I give Grand Canyon
National Park only one star as a National Park is tha
pretty much all of the really awesome things you cou

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vocal
manner
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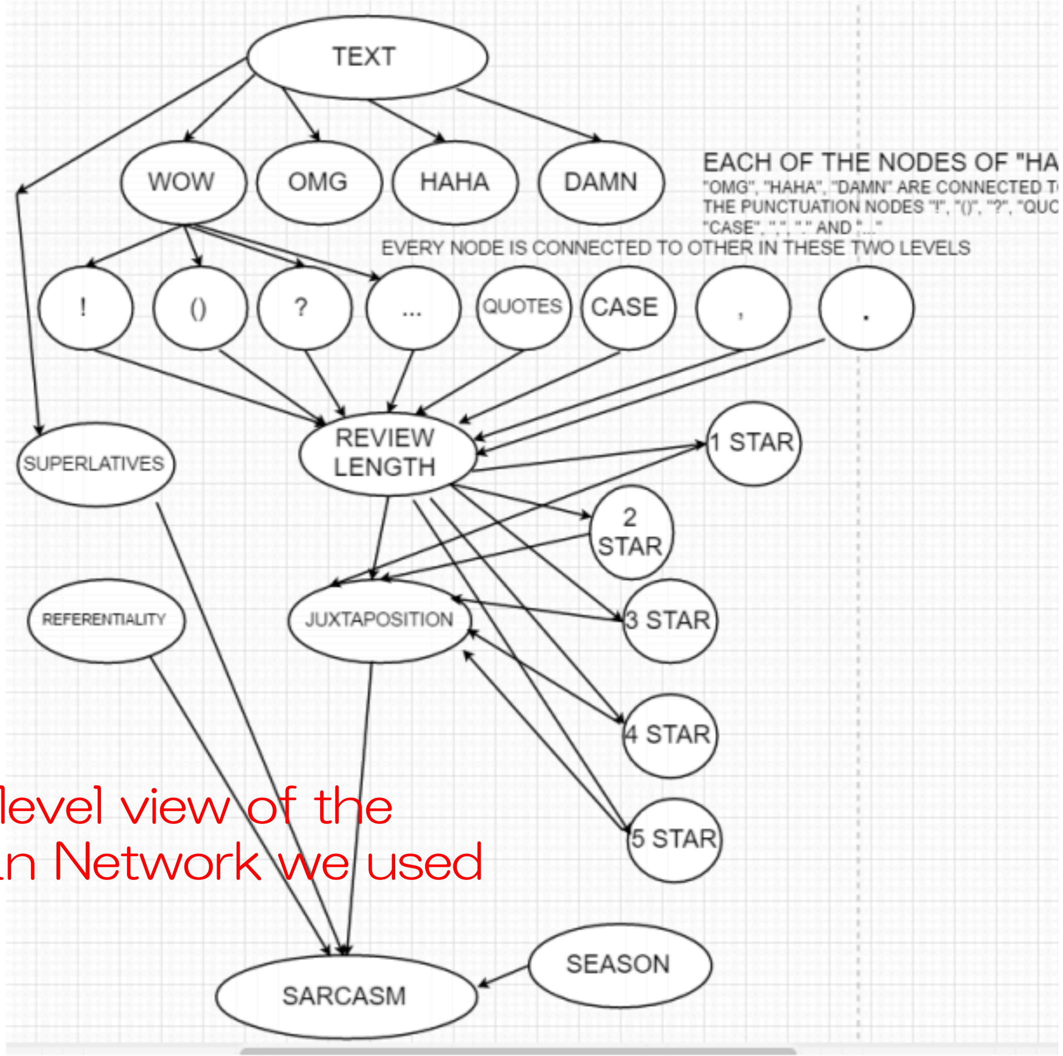
told
company
punctuation
individual
context
cultures

Sarcastic Feature Selection


TEXT
WOW
OMG
HAHA
DAMN
EACH OF THE NODES OF "HA
"OMG", "HAHA", "DAMN" ARE CONNECTED T
THE PUNCTUATION NODES "!", "()", "?", "QUO
"CASE", ",", "." AND "..."
EVERY NODE IS CONNECTED TO OTHER IN THESE TWO LEVELS
!
()
?
...
QUOTES
CASE
,
.
SUPERLATIVES
REVIEW LENGTH
1 STAR
2 STAR
REFERENTIALITY
JUXTAPOSITION
3 STAR
4 STAR
5 STAR
SEASON
SARCASM

a high-level view of the Bayesian Network we used

Parameters of the Model

Feature	Types
Keyword(s)	“wow” “OMG” “damn”
Punctuation	“!” “()” “…” “ “” ”
Referentiality	“I” “me” “myself” “we” “us”
Season	“winter” “fall” “summer” “spring”
Superlatives	“worst” “best” “word ending in -est”

Method

- harness the presence of contextual incongruity in user reviews

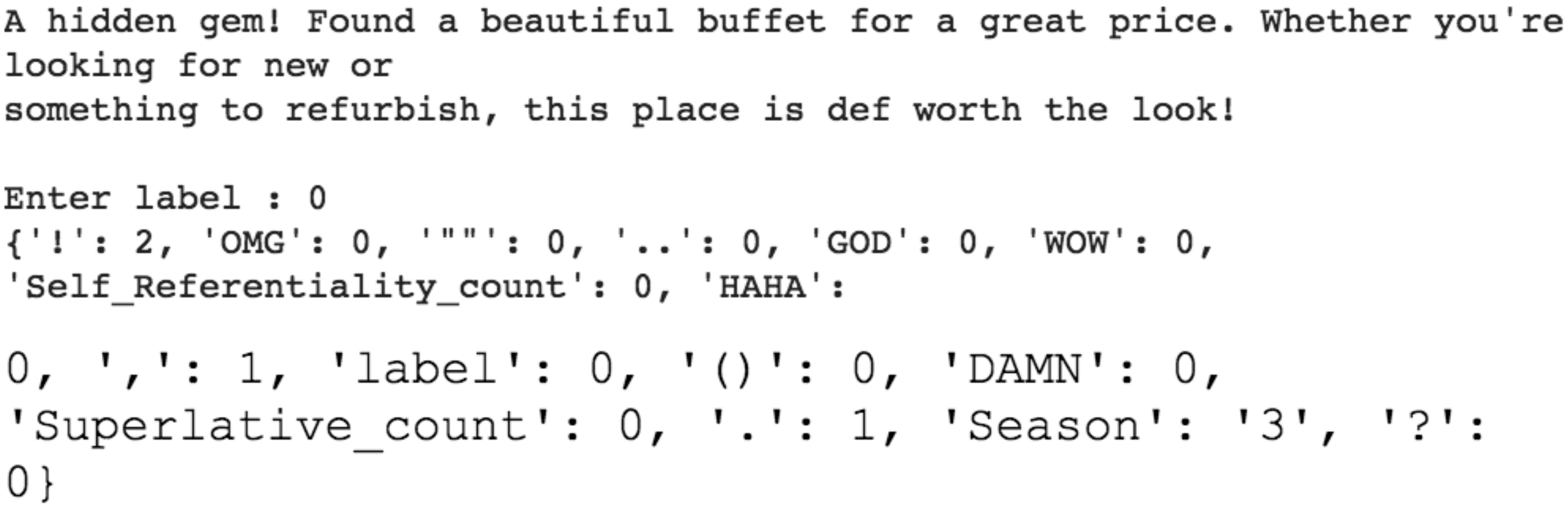
  i.e. sentiment juxtaposition (5-star in rating with a negative sentiment, & vice versa)

inconsistency in sentiment will be indicative of some level of ironic text

Data

preprocessing step is initialized with creating a dictionary that reads through each of the (~4mil) reviews and calculates the # of times for each instance of a categorized feature appearing in that review text

An example from a 4 star review

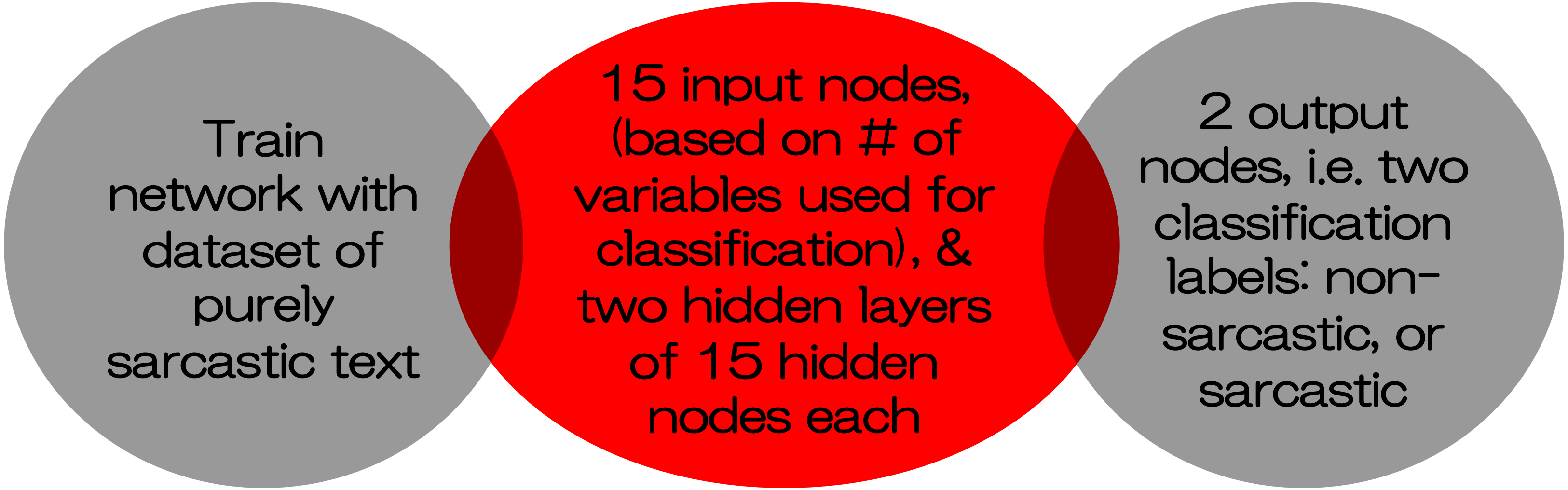


```
A hidden gem! Found a beautiful buffet for a great price. Whether you're
looking for new or
something to refurbish, this place is def worth the look!

Enter label : 0
{'!': 2, 'OMG': 0, '""': 0, '..': 0, 'GOD': 0, 'WOW': 0,
'Self_Referentiality_count': 0, 'HAHA':
0, ',': 1, 'label': 0, '()': 0, 'DAMN': 0,
'Superlative_count': 0, '.': 1, 'Season': '3', '?':
0}
```

THIS IS
DEEPLEARNING

A simple network



Train network with dataset of purely sarcastic text

15 input nodes, (based on # of variables used for classification), & two hidden layers of 15 hidden nodes each

2 output nodes, i.e. two classification labels: non-sarcastic, or sarcastic

1-star and 3-star rated reviews demonstrated a high level of accuracy, 95% and 96% respectively

Notes on network parameters

built-in optimizer (Adam) used to calculate the cross entropy between the predicted & true label

Activation functions used between pairs of levels (Relu for the path from the 1st to the 2nd hidden layer)

applications of deep learning algorithms

Why do we want to know if users are being sarcastic?

- less genuinely indicative of customer attitude
- would definitely get some more valuable feedback on the company at large
- will help to improve the customer experience at large.

BEWARE
OF
SARCASM

Future Directions

- use more manpower to rate the sarcastic nature of the reviews (rather than just us 2)
- Implementation of different machine learning models e.g. Restricted Boltzmann Machines and Hidden Markov Models to generate a time series model for for feature analysis of sarcasm in *real time*

Thanks!

Questions?

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