# Medical Text Classifier

*Built Differently by:* “The Natural Language Prodigies”

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# Business Problem

- Physicians overworked and overwhelmed
- Lots of research to read
- Our model will point them to the ***most relevant*** research papers by field of medicine:
  - Cancer
  - Digestive
  - Neuro
  - Heart

# 26.7 hours

Of clinical work per day physicians would need to do to provide guideline-recommended care[1]

+

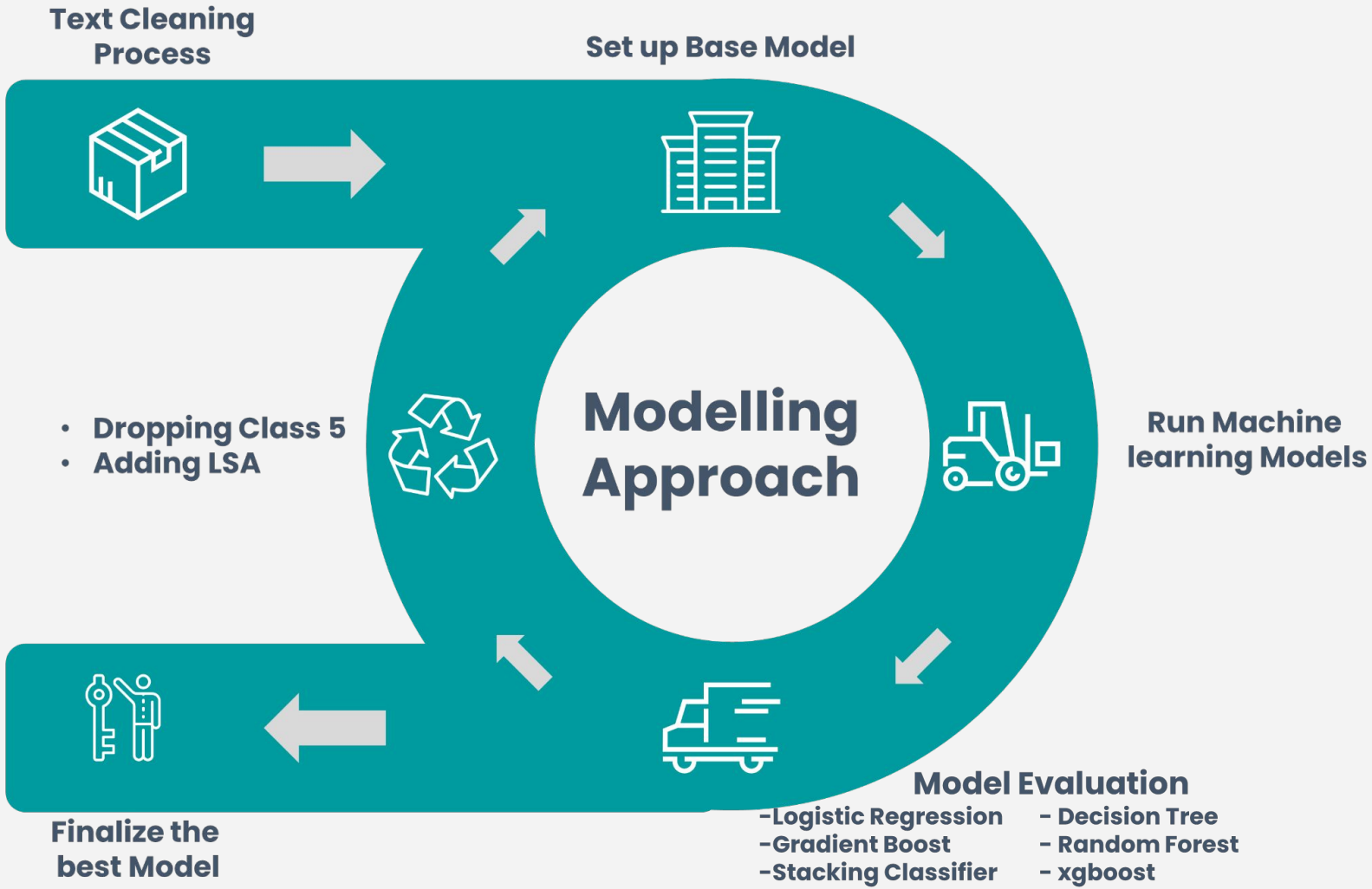
# 68%

Of physicians feel overwhelmed by the amount of information they need to review to stay current[1]

# 3.5 years

The rate at which medical knowledge is doubling[1]

1. HealthcareFinanceNews.com (link)




- Dropping Class 5
- Adding LSA

-Logistic Regression
-Gradient Boost
-Stacking Classifier
-Neural Networks
- Decision Tree
- Random Forest
- xgboost

# Cleaning Process

01 **Tokenize**

Define function to remove punctuation, change to lowercase and separate words

02 **Filter**

Use NLTK’s stopwords list to filter out superfluous words from our lists of tokens

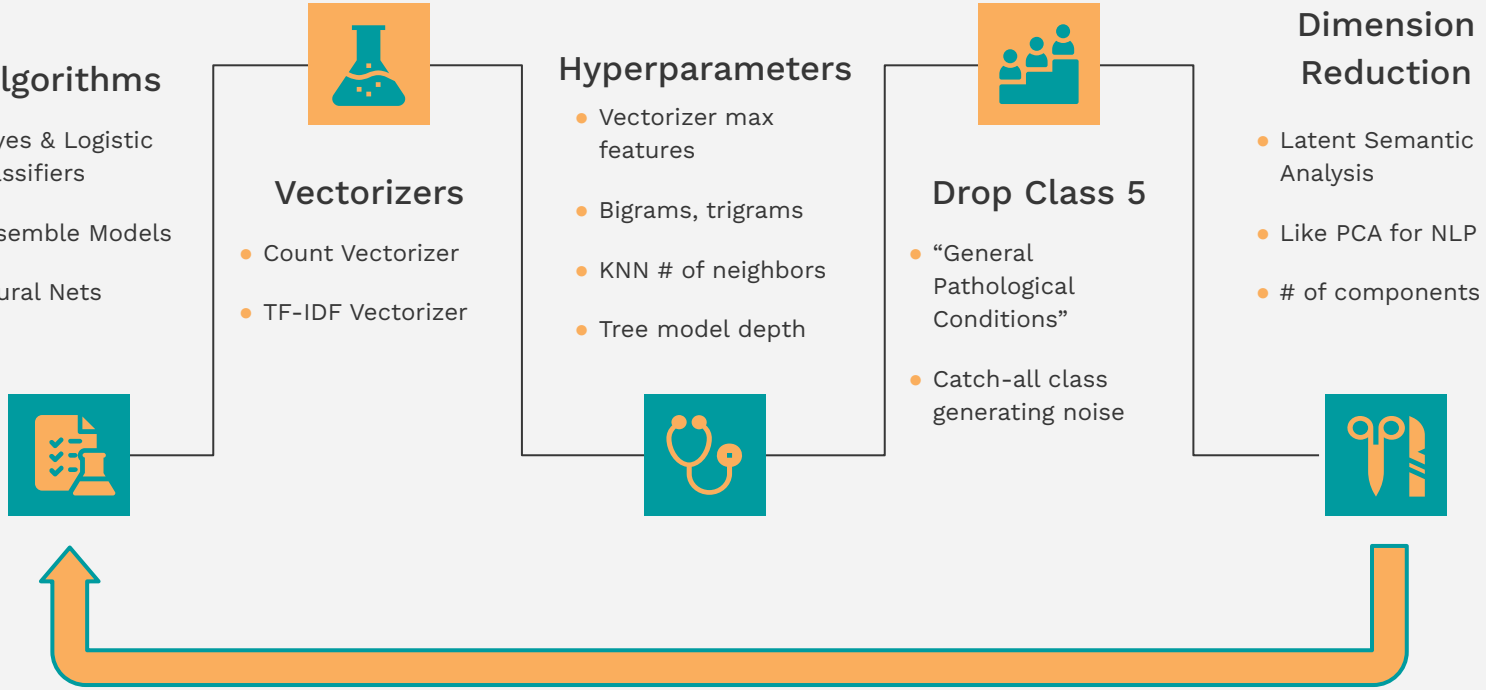
03 **Lemmatize**

Lemmatize rather than stem to prioritize accuracy and dataset is not huge

04 **Common Word Removal**

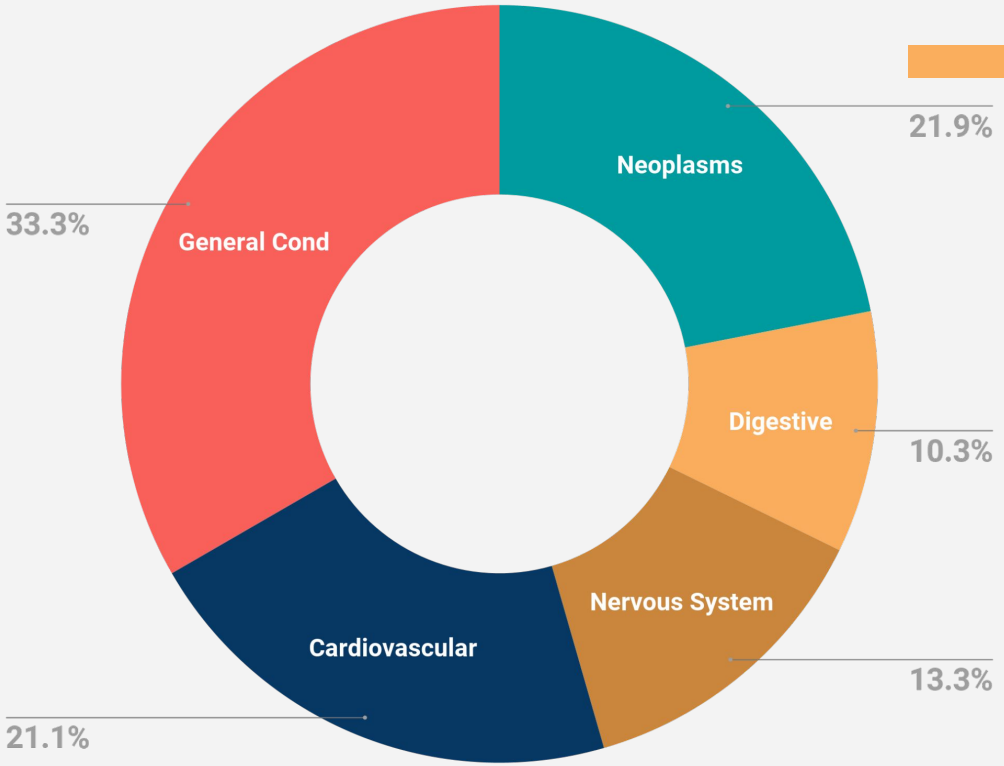
Identified frequent words common to all classes and removed them

# Iterative Process



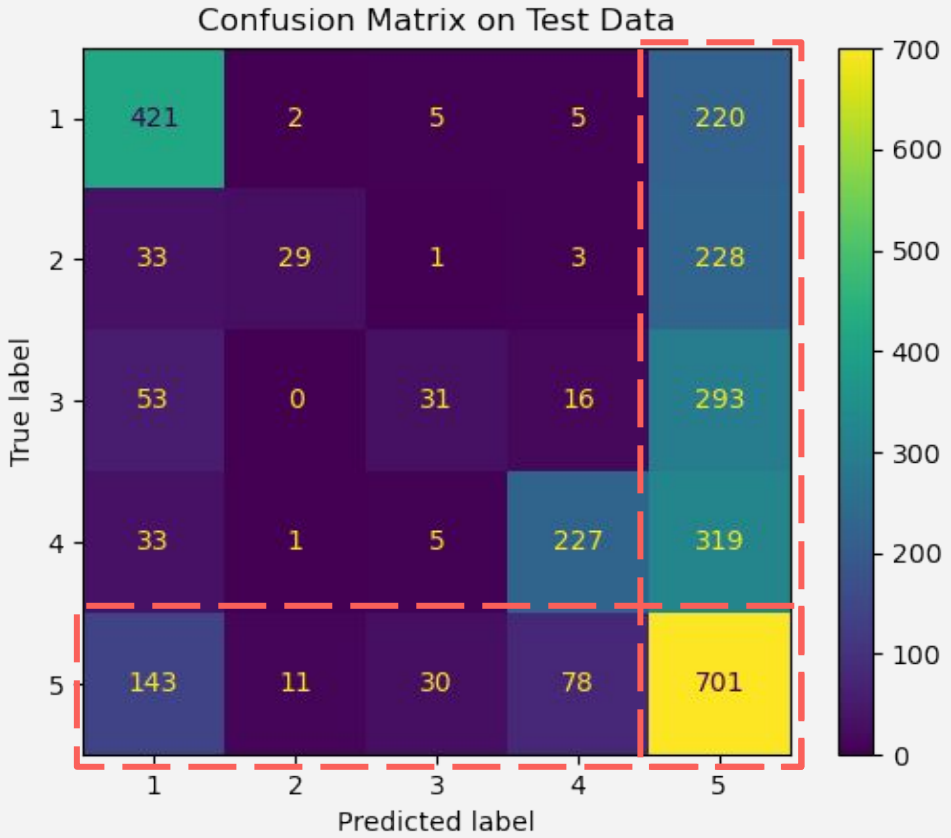
# Class Distribution

| | |
|---|---|
| Neoplasms | 3,163 |
| Digestive | 1,494 |
| Nervous System | 1,925 |
| Cardiovascular | 3,051 |
| General Conditions | 4,805 |

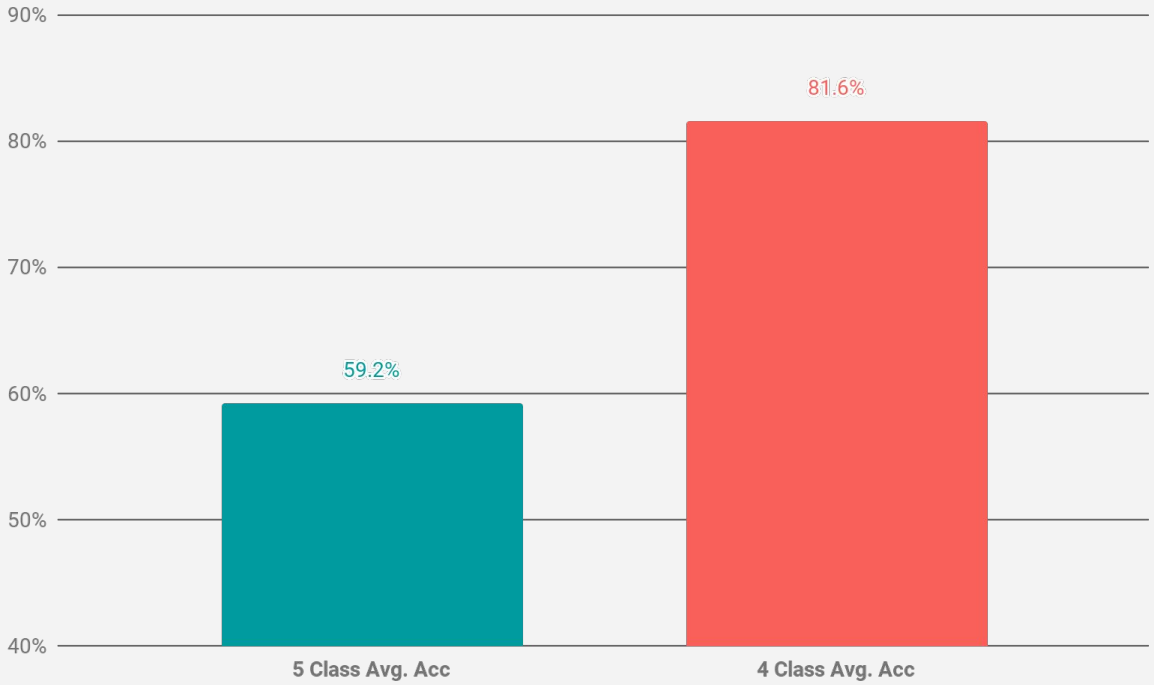


# Confusion Matrix for Five Class KNN

1. *Neoplasms (Cancer)*
2. *Digestive diseases*
3. *Nervous system diseases*
4. *Cardiovascular diseases*
5. ***General pathological conditions***



# 5 Class vs. 4 Class




22.4%

Increase in Accuracy

# Hyperparameter Tuning

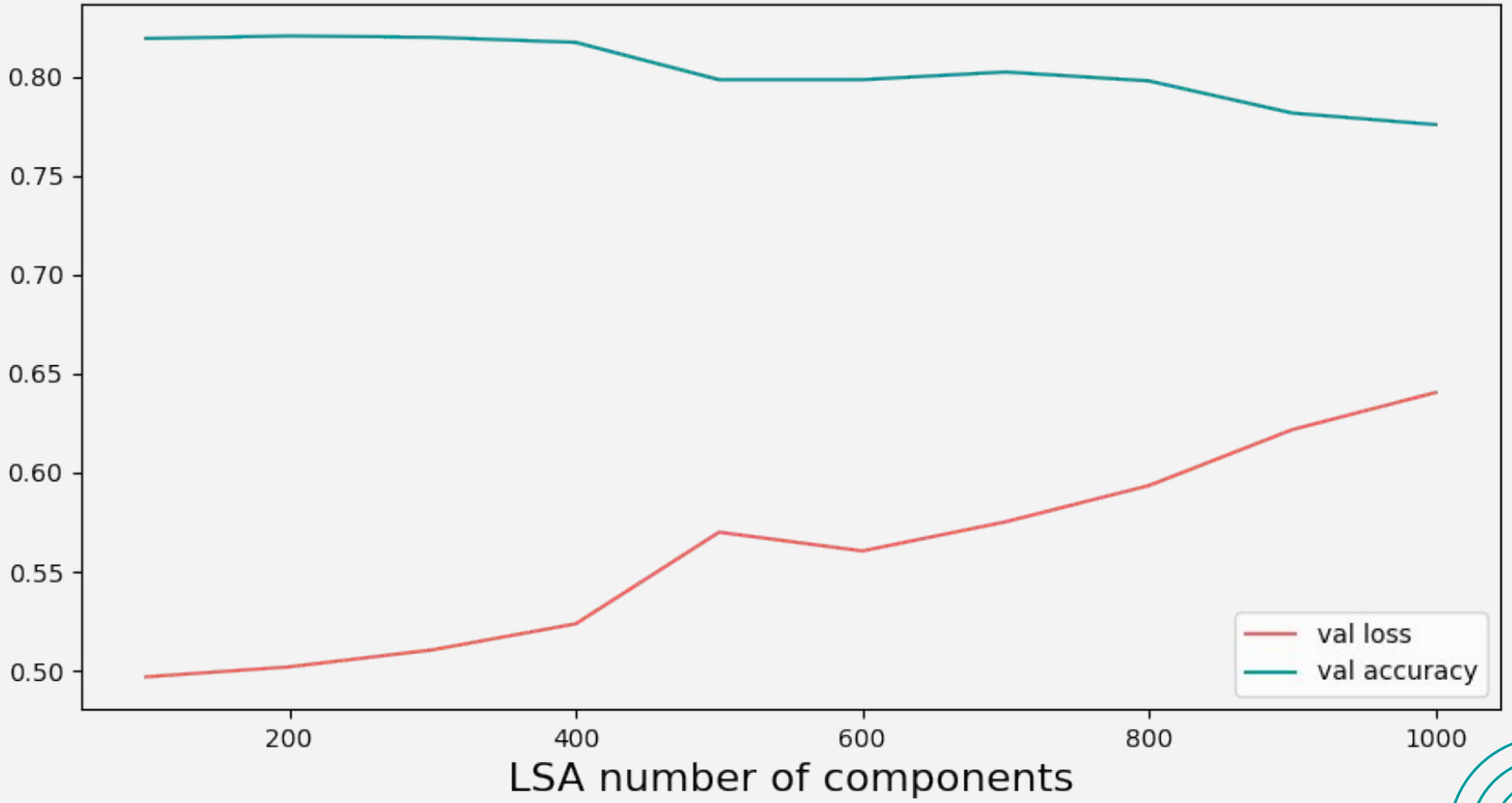
## Vectorization

- Count
- TF-IDF

## Ngram range

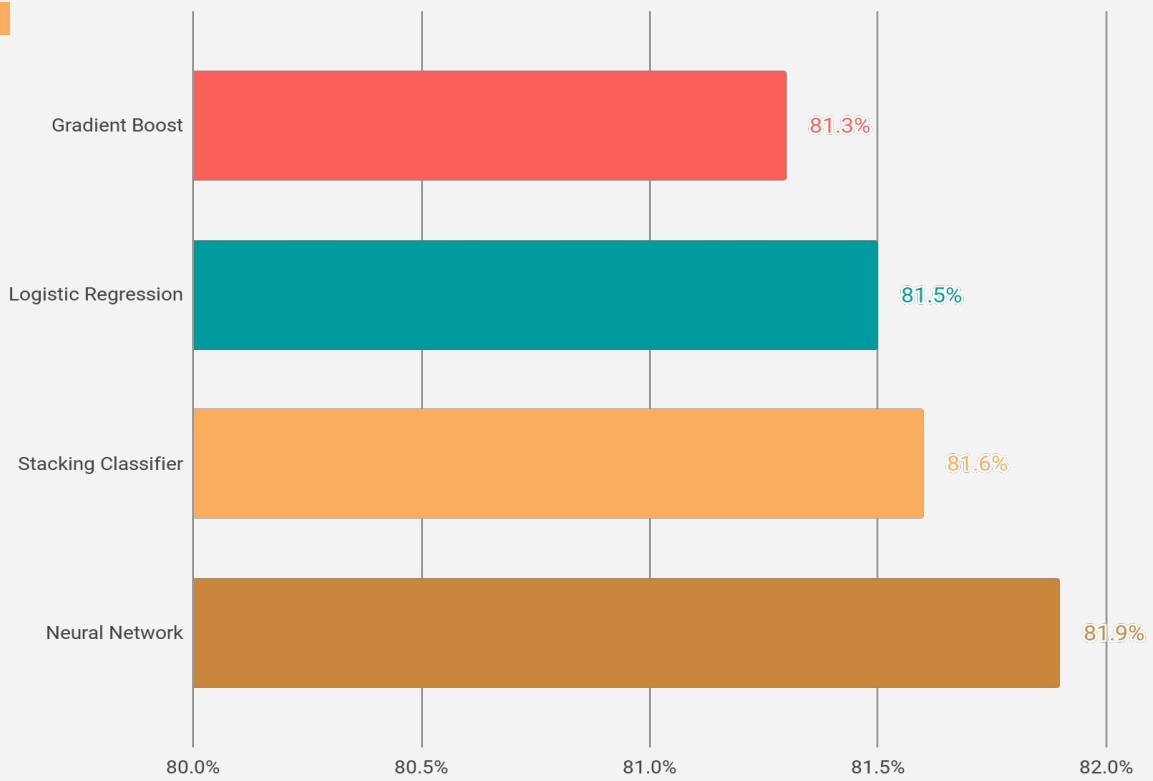
- Unigrams
- Bigrams
- Trigrams

# Latent Semantic Analysis[1]




1. *Neural Network performance with varying degrees of LSA components*

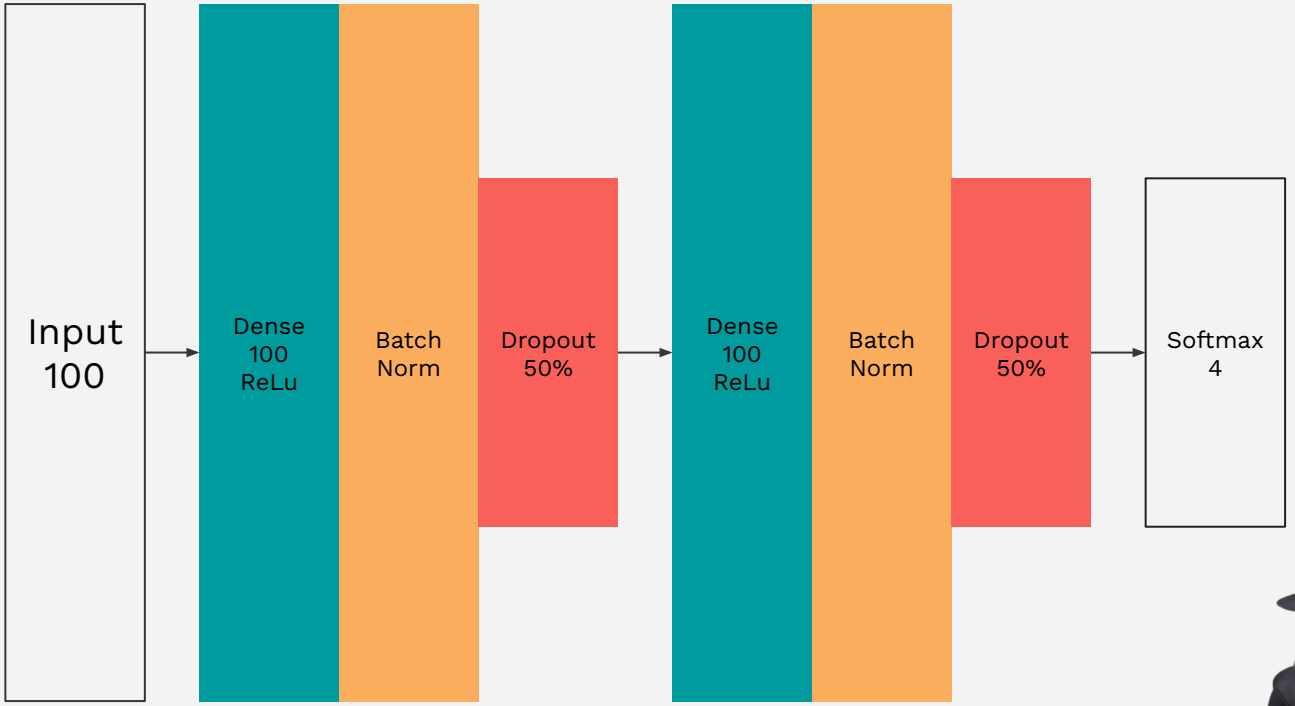
# Top 4 Models




**81.9%**

## Neural Network Accuracy

# The Disease Deducer




Params:

- TF-IDF
- LSA = 100
- Adam optimizer
- Batch size = 32
- Early stopping with patience of 5

# Conclusion

- Neural Nets are good
- We need more data
- We’re ready to sell our model to Google or whatever

# Next Steps

- Other possible applications
- Training on more data
- More classes
- Improve accuracy using Word2Vec
- Sequential modeling

# Thanks! Questions?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