Text Extraction

FinTech

Lesson 12.3

Sign up for AWS Account

Instructions can be found here

Sign up for Koho prepaid card here

Or get a prepaid credit card (any convenience store)

Class Objectives

By the end of the class, you will be able to:

- Understand spaCy capabilities and where to find documentation.
- Be able to use POS tagged text to extract specific words.
- Use dependency-parsed text to extract descriptors.
- Extract specific types of entities from text.
- Correlate text features to real-world series like stock prices.
- Create a dashboard from NLP sentiment features.

spaCy

spaCy

spaCy

- Core functions depend on language models learned from tagged text
- Fast and flexible
- Designed specifically for production use

NLTK

- Core functions depend on language models learned from programmed rules
- Accurate
- Intended for educational and prototyping purposes

spaCy

We will use spaCy for:

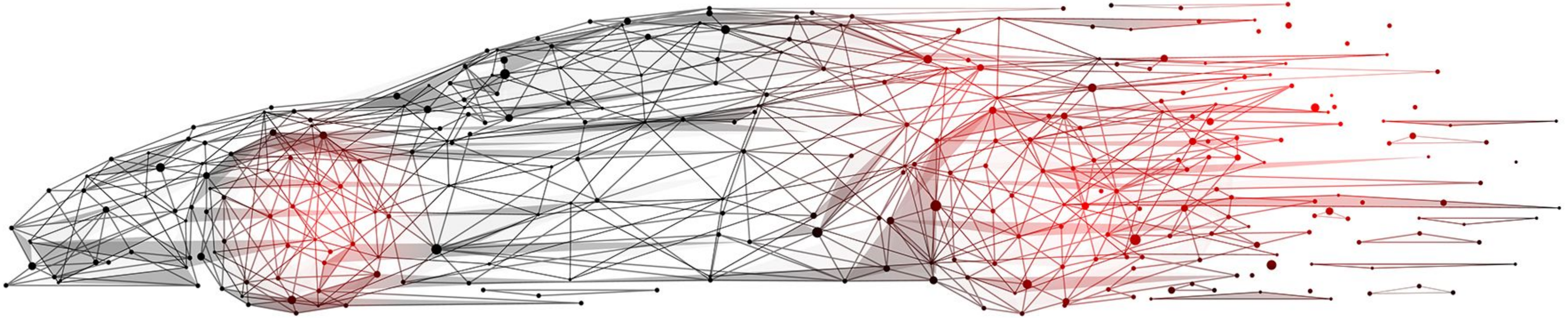
- Part of speech tagging
- Named entity recognition
- Dependency parsing

These tasks are more suitable for **model-based solutions** because they are complex and depend highly on context.

spaCy also provides tools for tasks like **tokenization** and **lemmatization**, which we've already learned with NLTK, and creating word vectors.

spaCy

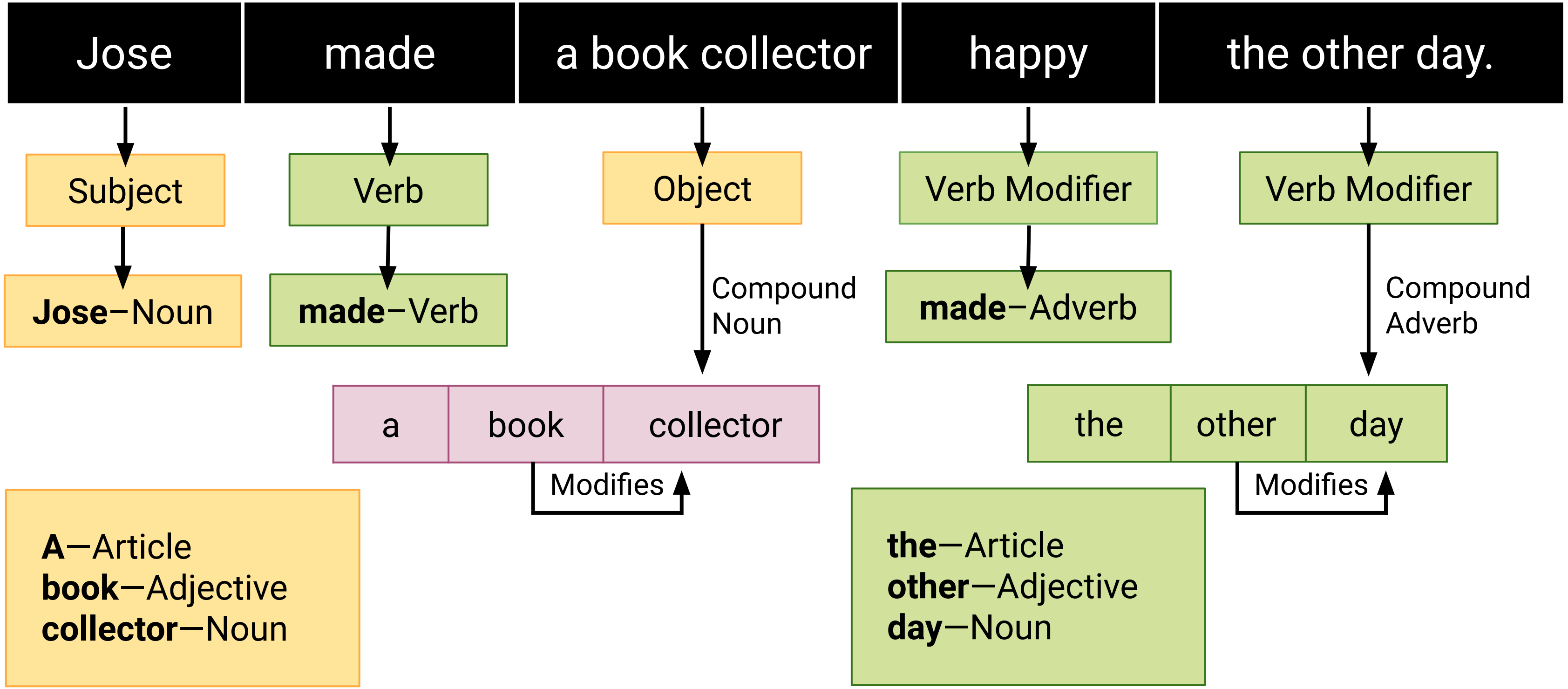
In comparison to NLTK, spaCy's language models trade off accuracy for speed, so if the corpus is large, you may prefer a simpler, rule-based solution.



POS Tagging and Dependency Parsing

Part-of-Speech (POS) Tagging

POS tagging categorizes each word in a sentence by its grammatical role.



Jose | made | a book collector | happy | the other day.

Subject

Jose–Noun

Verb

made–Verb

Object

Compound Noun

a | book | collector

Modifies

A—Article
book—Adjective
collector—Noun

Verb Modifier

made–Adverb

Verb Modifier

Compound Adverb

the | other | day

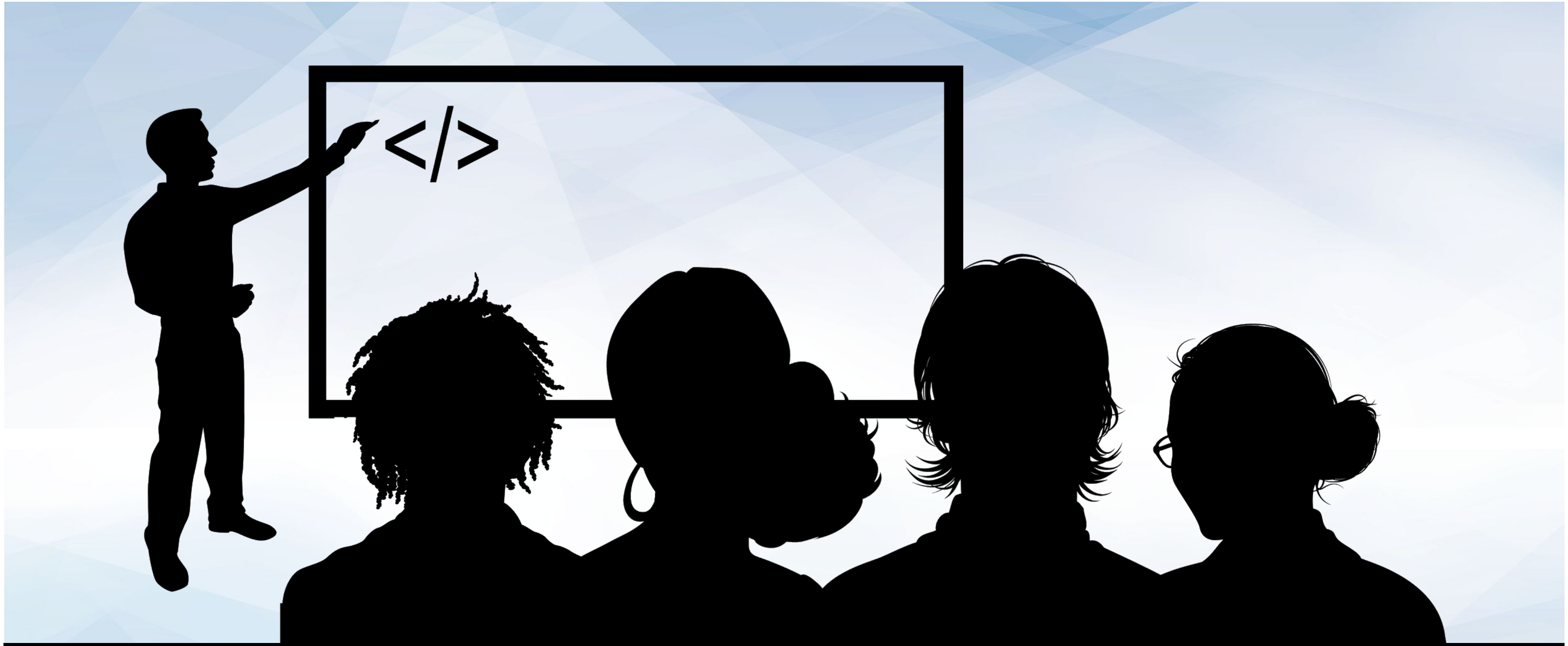
Modifies

the—Article
other—Adjective
day—Noun

Pip packages

Please run the following in your conda environment:

```
conda install -c conda-forge spacy
python -m spacy download en_core_web_sm
```



Instructor Demonstration

POS Tagging and Dependency Parsing

Activity: Describing America

In this activity, you will use the inaugural address corpus from NLTK and spaCy's parsing and POS-tagging modules to analyze inaugural addresses delivered by US presidents.

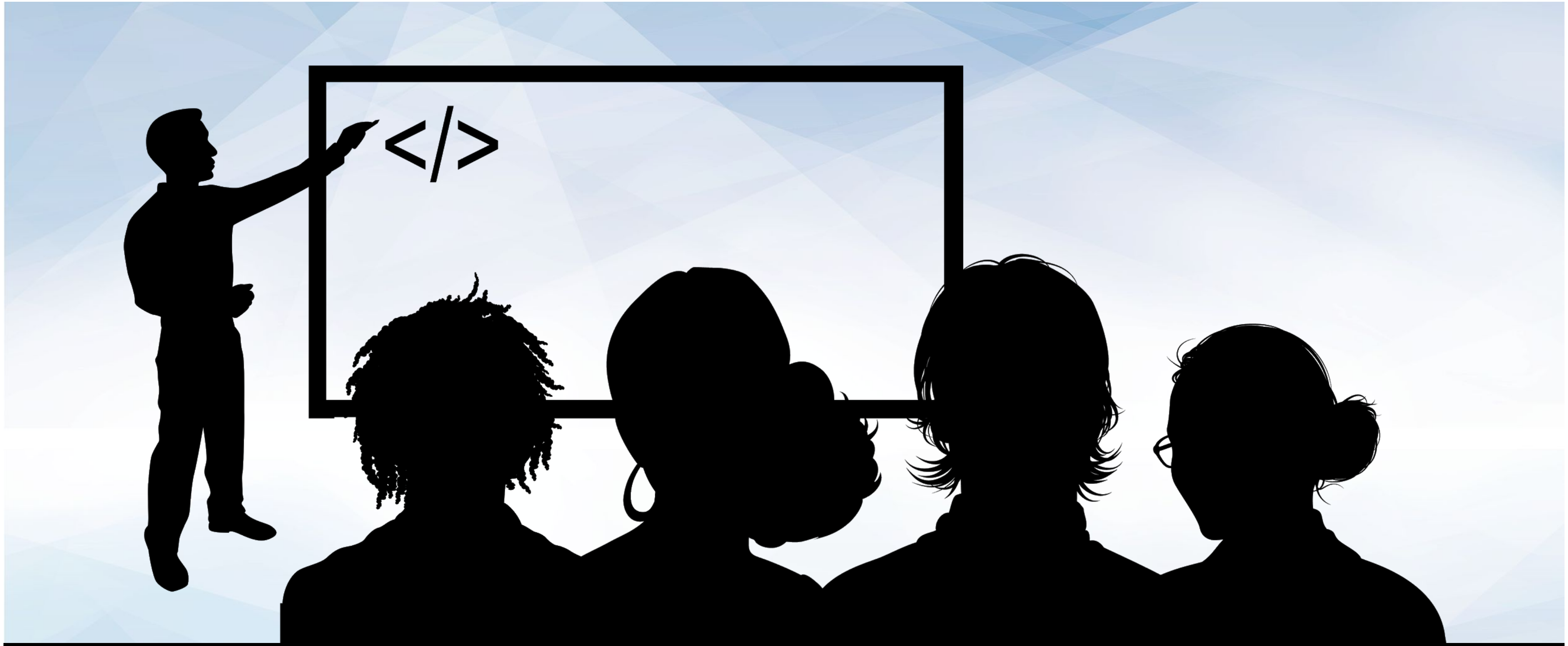
Suggested Time:
20 minutes

Time’s Up! Let’s Review.

Named Entity Recognition

Extracting named entities, which include proper nouns and other specific types of nouns such as currencies, from a text.

US **GPE** unveils world’s most powerful supercomputer, beats China **GPE** . The US **GPE** has unveiled the world’s most powerful supercomputer called 'Summit', beating the previous record-holder China **GPE** ‘s Sunway TaighuLight **ORG** . With a peak performance of 200,000 **CARDINAL** trillion calculations per Second **ORDINAL** , it is over twice as fast as Sunway TaighuLight **ORG** , which is capable of 93,000 **CARDINAL** Trillion calculations per second. Summit has 4,608 **CARDINAL** servers, which reportedly take up the size of two **CARDINAL** tennis courts.



Instructor Demonstration

Named Entity Recognition

Activity: NER Clouds

In this activity, you will extract named entities of your choosing from the Reuters Corpus, and build a word cloud from these entities.

Suggested Time:
15 minutes

Time's Up! Let's Review.

Break

Text as Feature

Tools and Techniques

Tools and techniques used to create numerical features (structured data) from text (unstructured data):

Tools

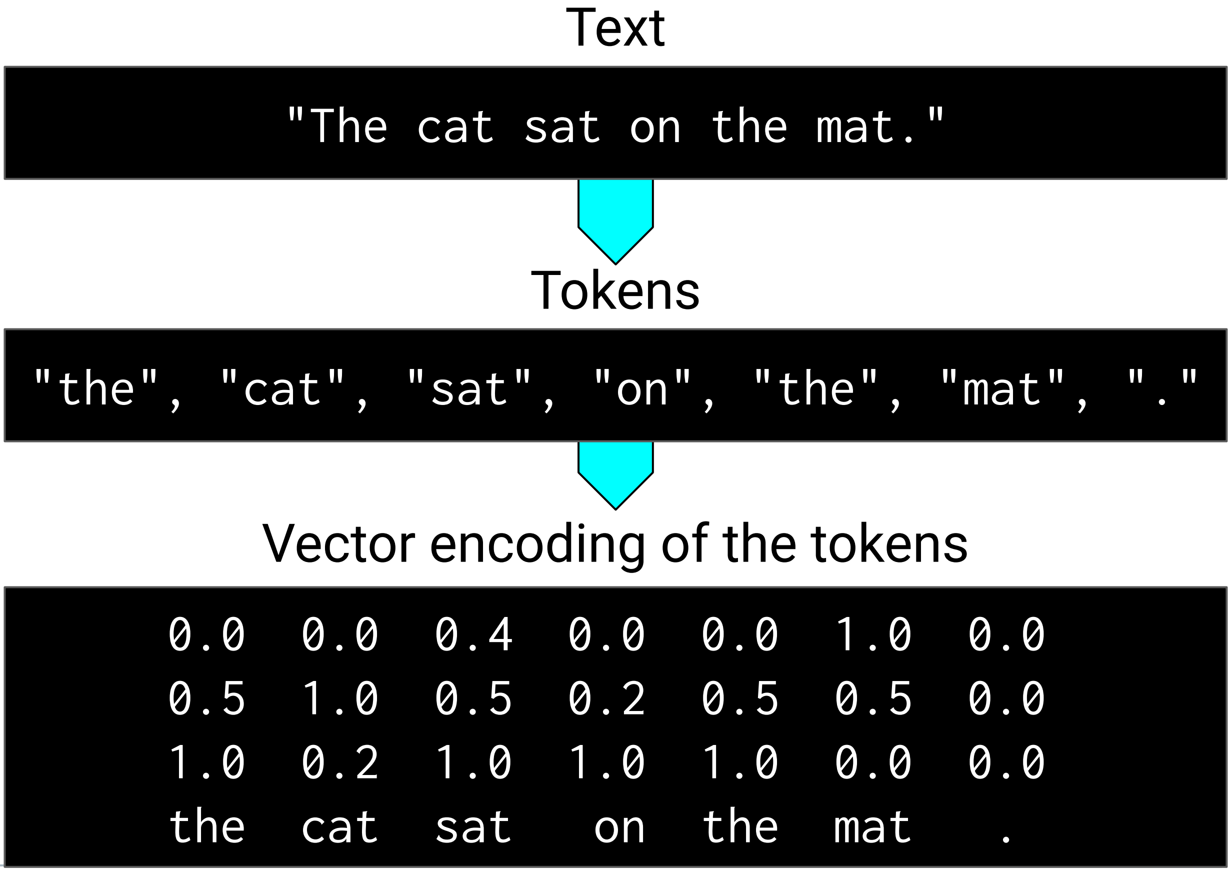
- NLTK
- Word clouds
- spaCy

Techniques

- preprocessing
- tokenizing text
- lemmatizing text
- aggregating word counts
- creating n-grams
- normalizing to TF-IDF weights
- sentiment analysis
- parsing and pos-tagging text
- named entity recognition

Text as Feature

In order to use this data for classification or prediction, we need to make them features—numerical representations of unstructured text.



Text

```
"The cat sat on the mat."
```

Tokens

```
"the", "cat", "sat", "on", "the", "mat", "."
```

Vector encoding of the tokens

```
0.0  0.0  0.4  0.0  0.0  1.0  0.0
0.5  1.0  0.5  0.2  0.5  0.5  0.0
1.0  0.2  1.0  1.0  1.0  0.0  0.0
the  cat  sat   on  the  mat   .
```

What are some examples of features that can be created from text documents?

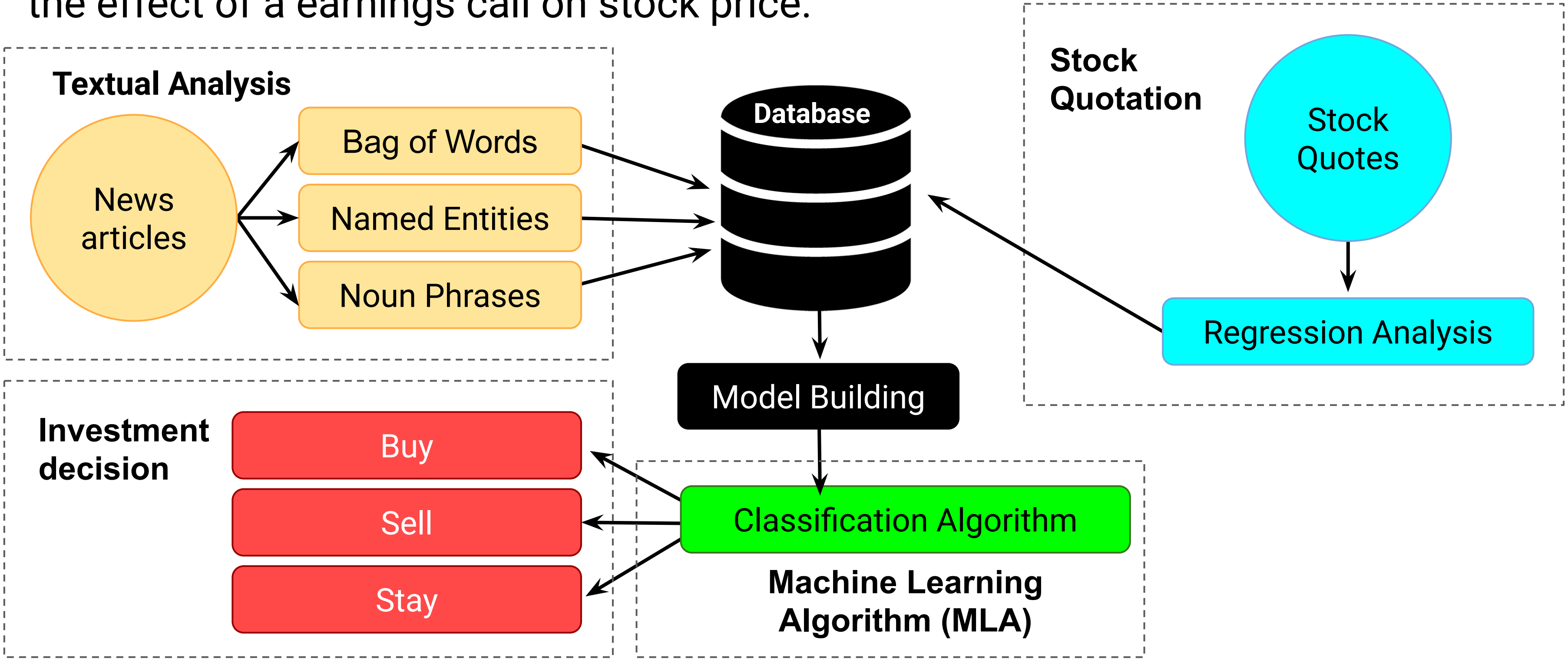
Text as Feature

Examples:

- count of a keyword
- count of named entities
- sentiment scores
- percent of words that are adjectives
- total TF-IDF score

Text as Feature

These features can then be used to classify a document to a category, or predict the effect of a earnings call on stock price.



Activity: Correlating Returns

In this activity, you will create a sentiment index from News API headlines and correlate it to S&P 500 daily returns, looking for a text topic that generates the highest correlation.

Suggested Time:
20 minutes

Time’s Up! Let’s Review.

Machine Learning Review

Questions?