R | Basic Text Analysis

Presented by Aviv Lo

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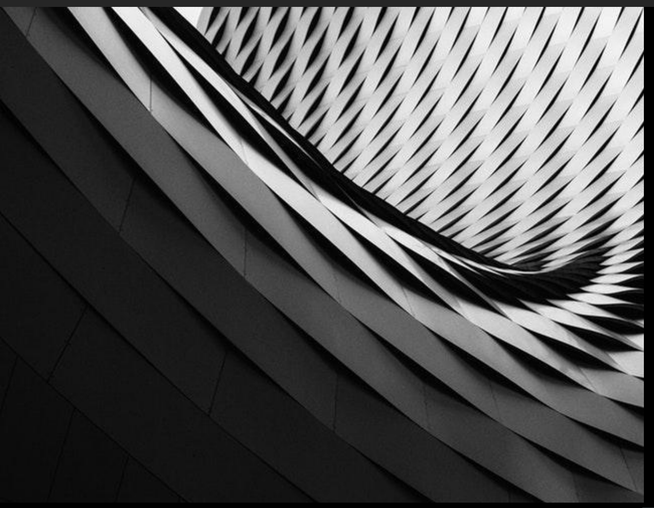
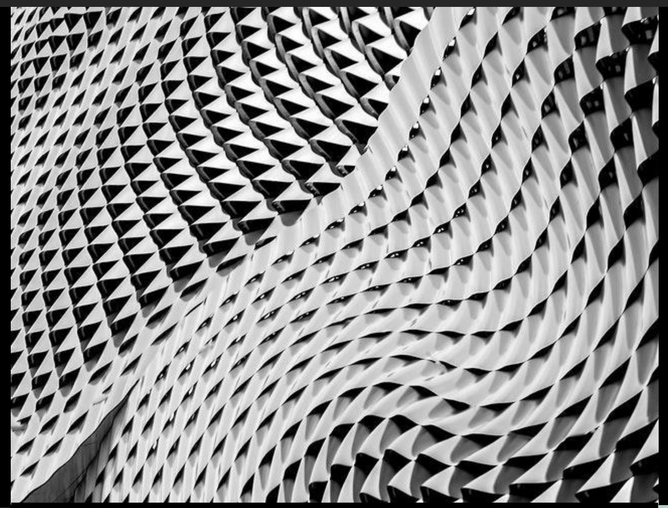


Topic 2

AI/ML/NLP Explained

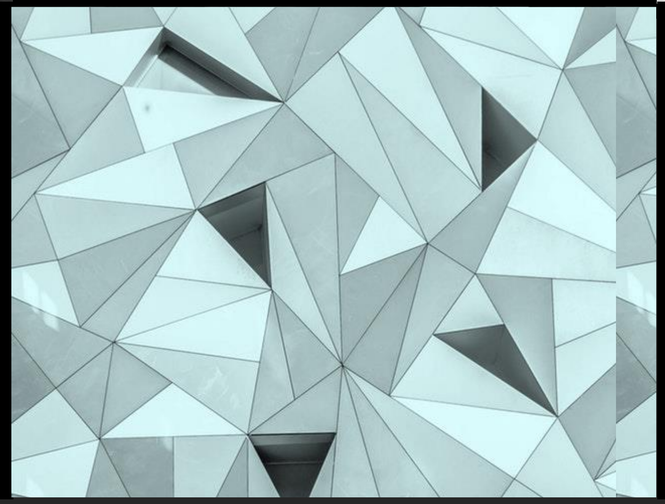


Topic 4

R Basics

Topic 1

What is R?

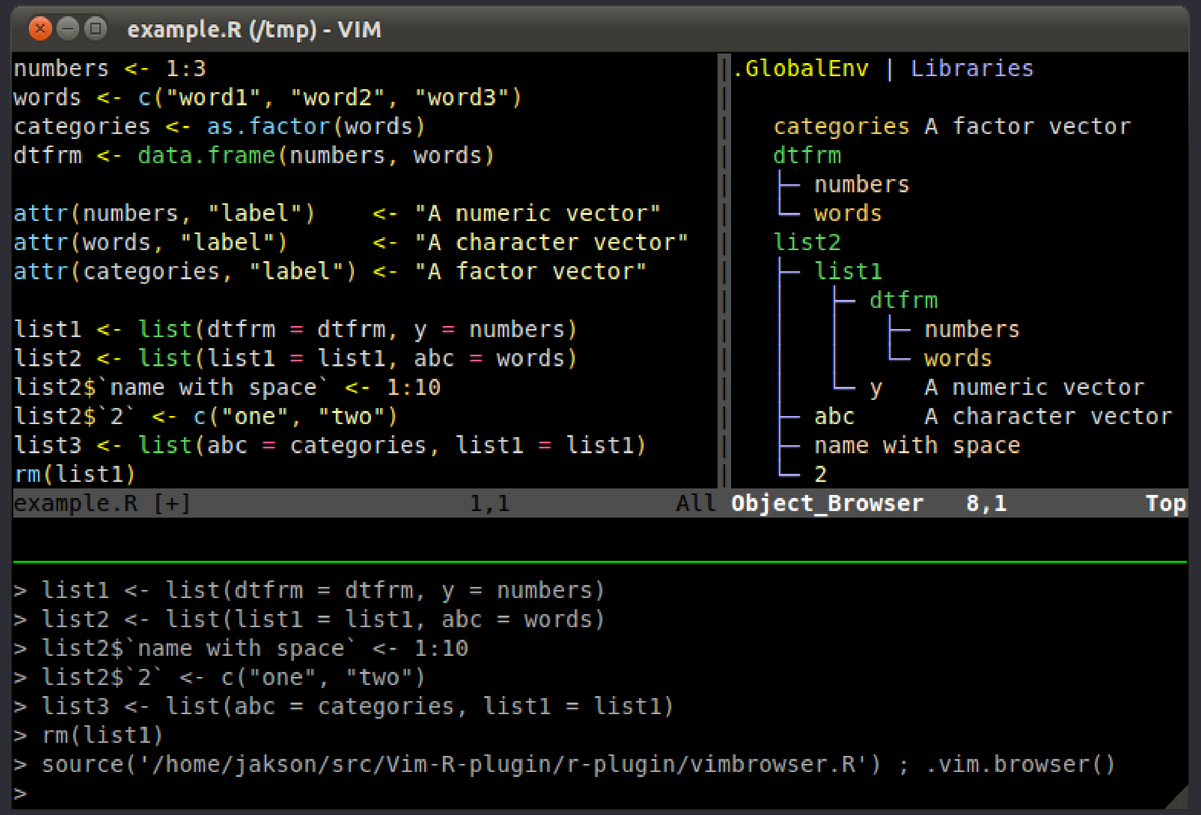


Topic 3

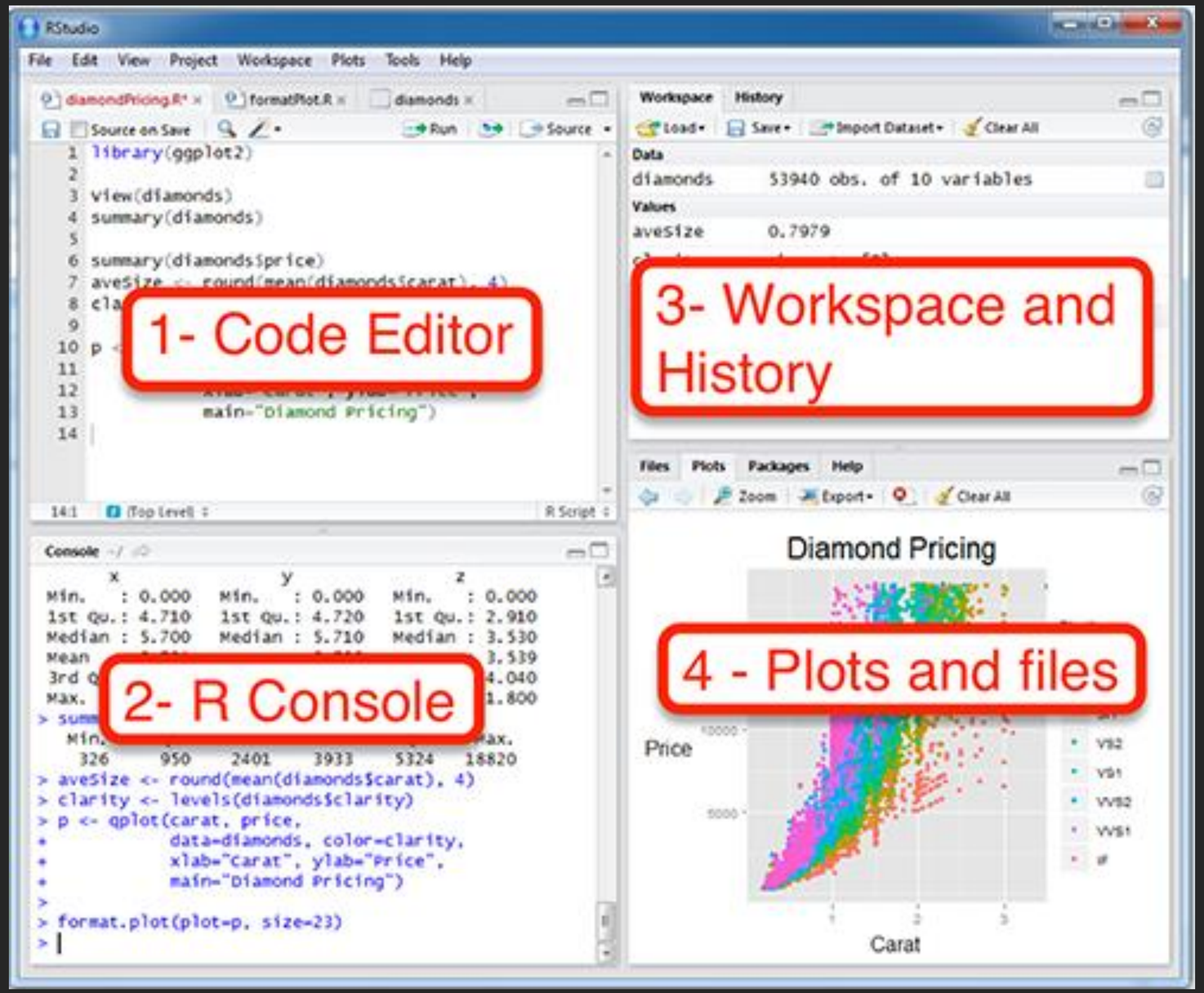
Text Analysis

1 What exactly is R?

1. Developed by Ross Ihaka and Robert Gentleman in 1991
2. Hence the name “R”
3. Maintained by The R Foundation for Statistical Computing
4. Difficult for beginners + Steep learning curve
5. Rich and powerful visualization libraries
6. Support matrix / vectorized operations
7. It’s born for stats



RStudio

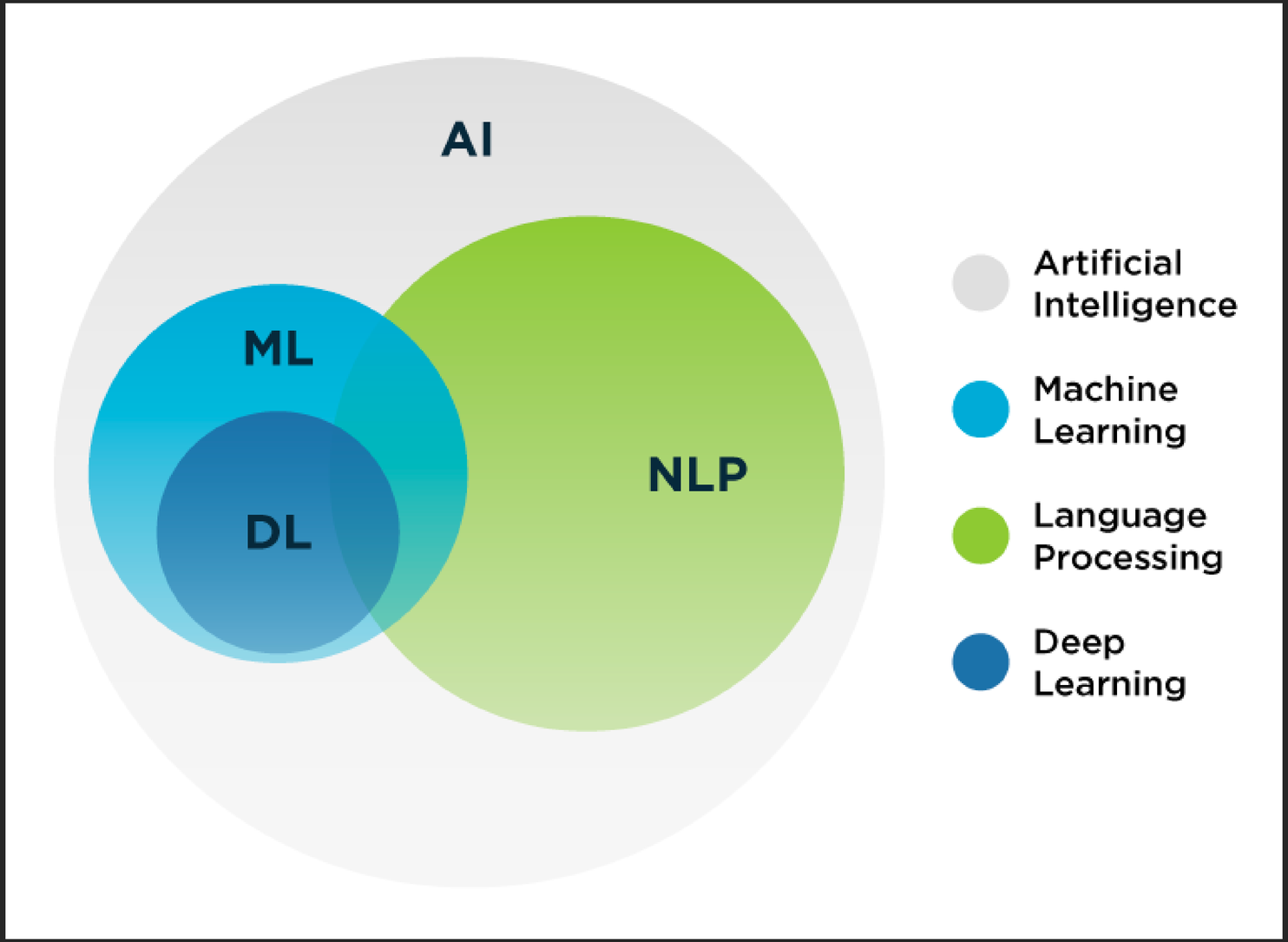

RStudio
File Edit View Project Workspace Plots Tools Help
diamondPricing.R* formatPlot.R diamonds
Source on Save Run Source
1 library(ggplot2)
2
3 view(diamonds)
4 summary(diamonds)
5
6 summary(diamonds$price)
7 aveSize <- round(mean(diamonds$carat), 4)
8 cla
9
10 p <
11
12
13 main="Diamond Pricing")
14
14:1 (Top Level) R Script
1- Code Editor
Workspace History
Load Save Import Dataset Clear All
Data
diamonds 53940 obs. of 10 variables
Values
aveSize 0.7979
3- Workspace and History
Console
x y z
Min. : 0.000 Min. : 0.000 Min. : 0.000
1st Qu.: 4.710 1st Qu.: 4.720 1st Qu.: 2.910
Median : 5.700 Median : 5.710 Median : 3.530
Mean 3.539
3rd Q 4.040
Max. 1.800
> summ
Min. ax.
326 950 2401 3933 5324 18820
> aveSize <- round(mean(diamonds$carat), 4)
> clarity <- levels(diamonds$clarity)
> p <- qplot(carat, price,
+ data=diamonds, color=clarity,
+ xlab="Carat", ylab="Price",
+ main="Diamond Pricing")
>
> format.plot(plot=p, size=23)
>
2- R Console
Files Plots Packages Help
Zoom Export Clear All
Diamond Pricing
Price
Carat
VS2
VS1
VVS2
VVS1
IF
4 - Plots and files

R vs. Python

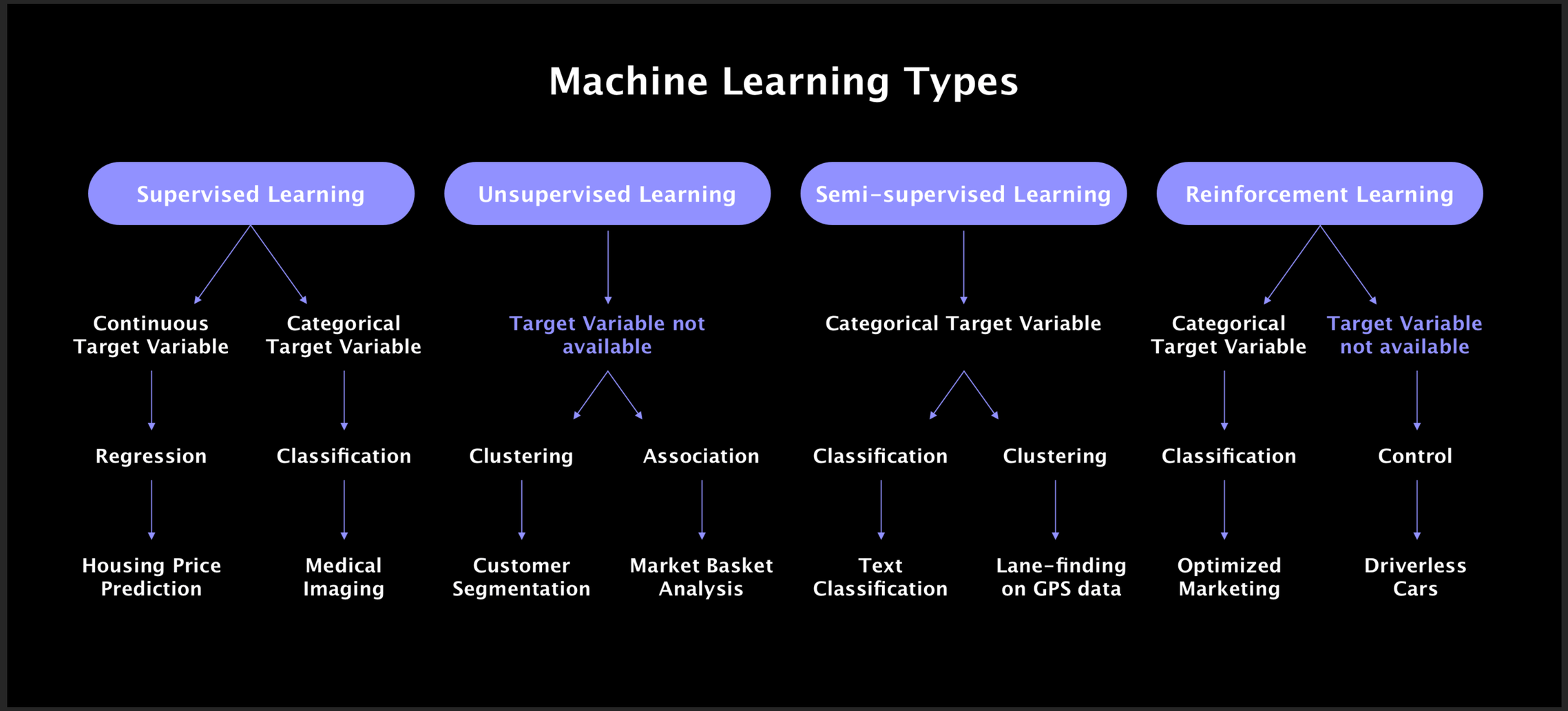
	Python	R
General	Python is a general-purpose programming lanuage for data analysis and scientific computing.	R is a functional programming enviornment and language for statstical computing and graphics.
Objective	Data Science, Web Developoment, Embedded Systems	Data Science & Statistical Modeling
IDE	**iPython, Pycharm, Jupyter Notebook, Spyder**	**Rstudio, R GUI, R KWARD**
Data Collection	Supports CSV files, **SQL**, **JSON**, and webscraping with **BeautifulSoup.**	Can also import csv files with built-in **readr** library. R's library **RCurl** provides a simple way to make API requests, similar to Python's **requests** package.
Data Analysis	Orgnaize dataframes with **Pandas** filtering, sorting. Python takes a more streamlined approach for data science projects.	Complex data visualizaiton tools make the exploratory data analysis (EDA) process much more complex than Python.
Essential Packages & Libraries	**Numpy, Pandas, matplotlib, scipy, scikit-learn, TensorFlow**	**caret, stringr, ggplot2, knitr, tidyverse, markdown, shiny, forcats, haven**
Database Handling Capacity	Can easily handle large data because there are less constraints for memory usage	R computes everything in memory, so its capabilities are limited by RAM size. A major downfall of R is the inability to handle massive amounts of data
Data Visualization	Despite the capabilities of data visualization tools like **Matplotlb** and **Seaborn**, Python fails to measure up to data visualization features of R.	Developed by and for statisticians, R has complex data visualzatioon features.
Syntax	The 'zen of python' is that there's a proper way to write code.	R doesn't have this set of rules. Also indexing starts at 1, which can be considered unconventional for general programmers.
Learning Curve	Simple and readable code structure makes it easier for beginners to learn. It also allows for object-oriented programing. It also offers a wide range of data structures that you wouldn't expect from a general-purpose language.	R's functional syntax isn't easy for beginners, but not too challenging for those well versed in programming. It also offers a few data structures, but fails to handle large amounts of data.

2 AI/ML/NLP Explained

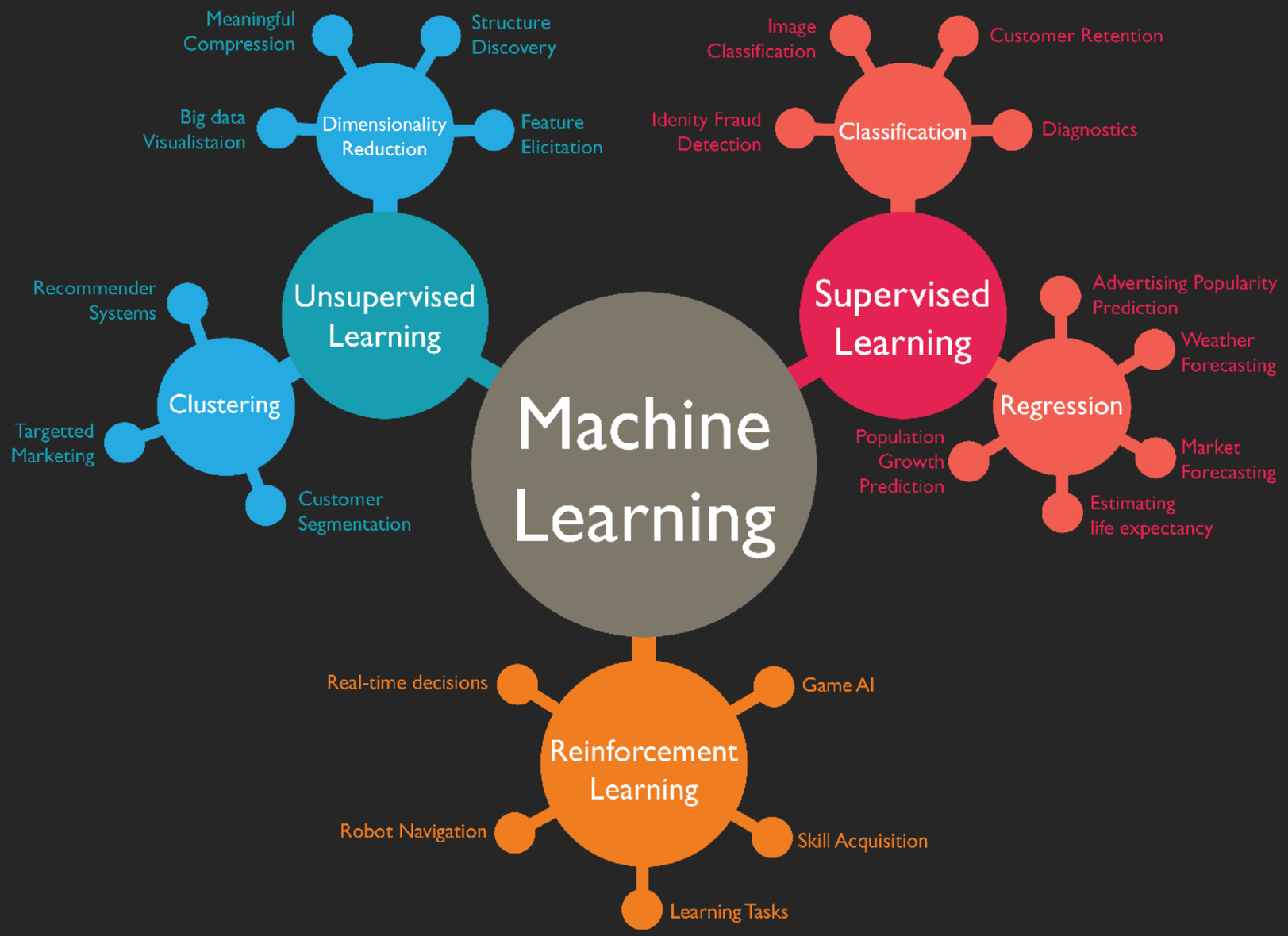
AI Domains


AI
ML
DL
NLP
Artificial Intelligence
Machine Learning
Language Processing
Deep Learning

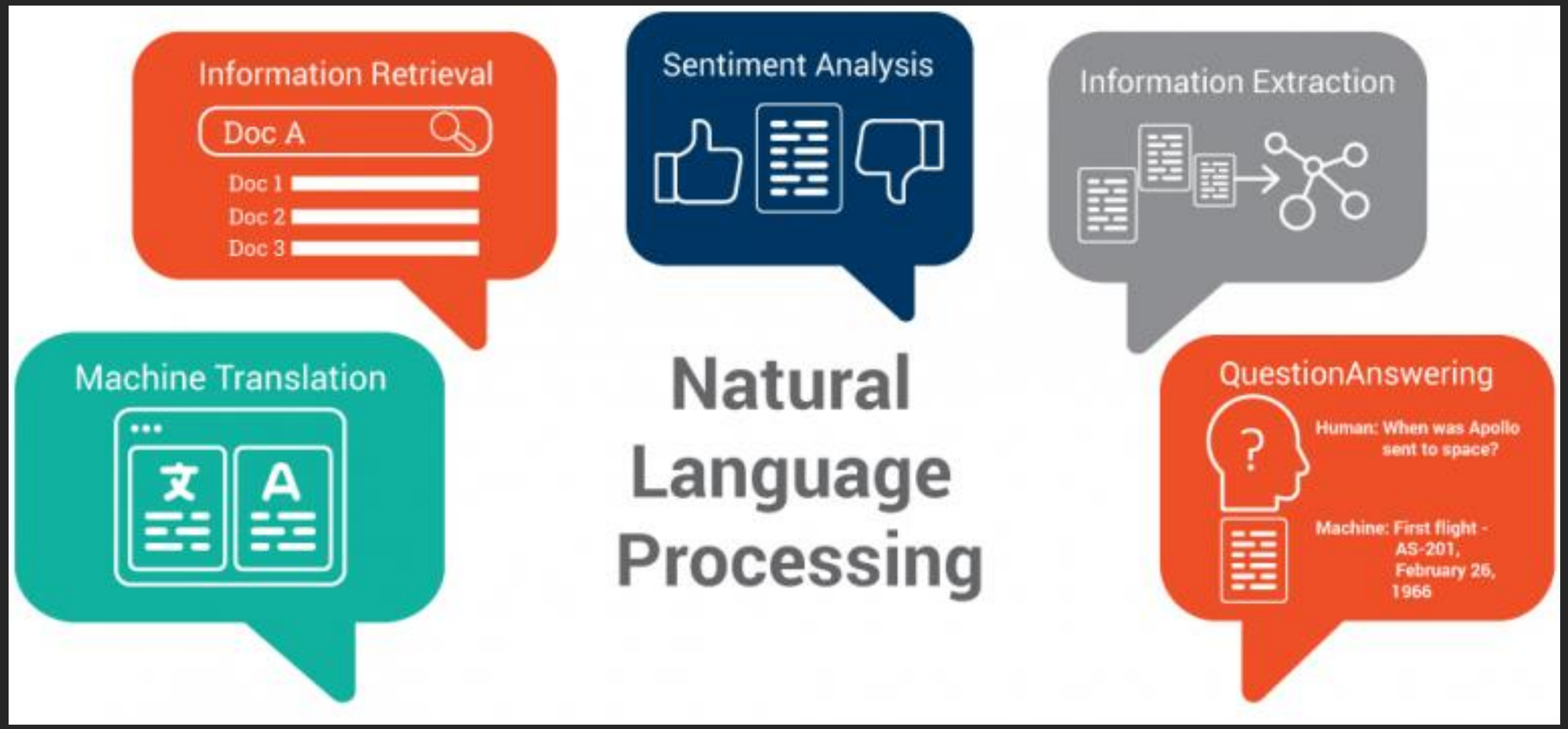
Machine Learning Family Tree



Machine Learning Family Tree

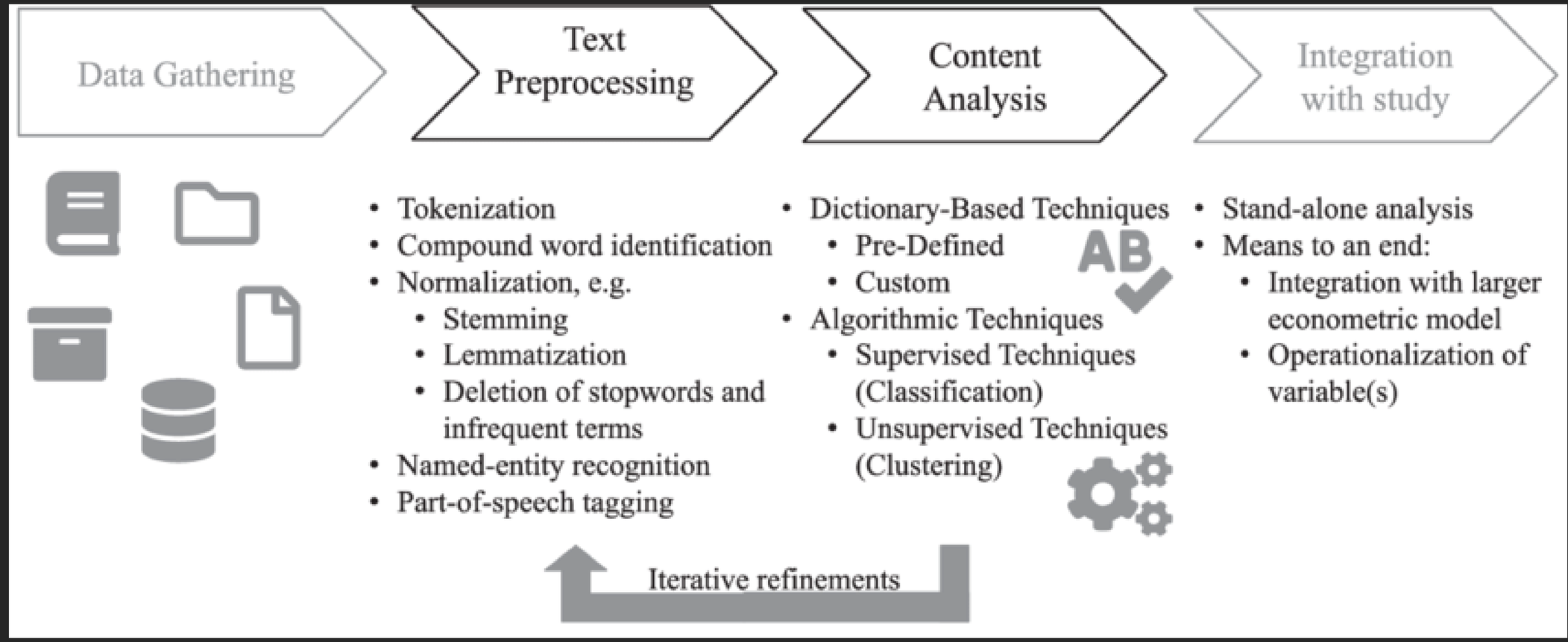


Types of NLP

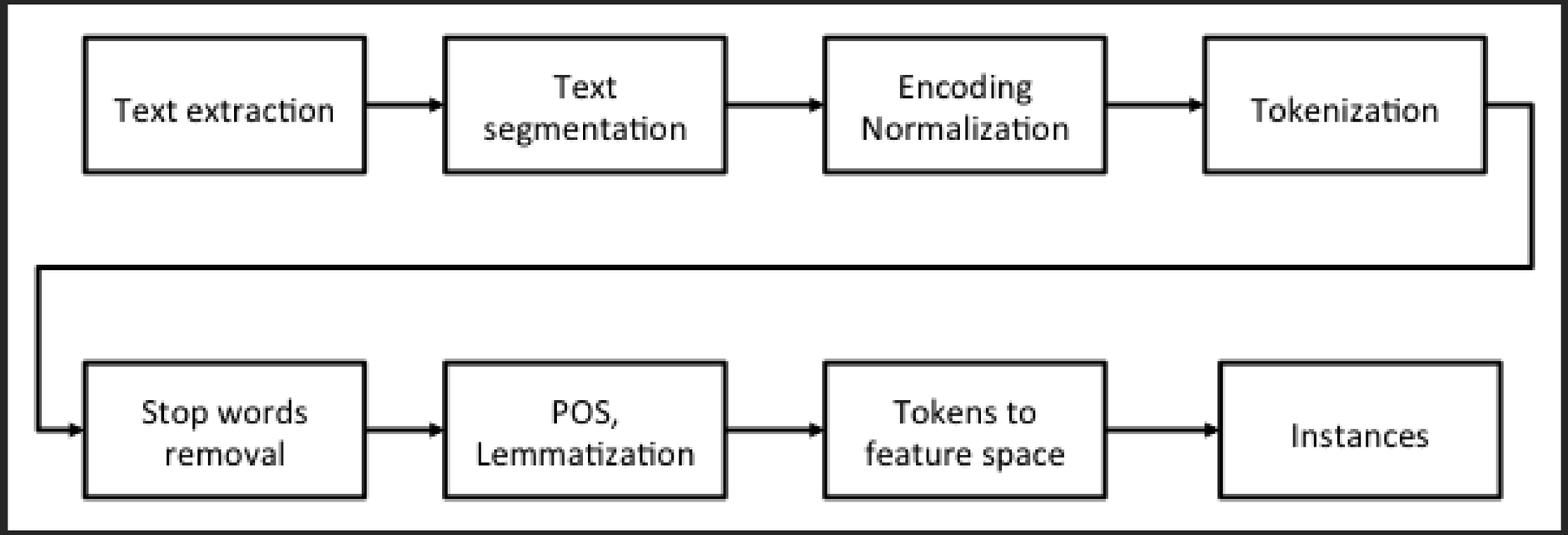

Information Retrieval
Doc A
Doc 1
Doc 2
Doc 3
Sentiment Analysis
Information Extraction
Machine Translation
Natural Language Processing
QuestionAnswering
Human: When was Apollo sent to space?
Machine: First flight - AS-201, February 26, 1966

3 Text Analysis

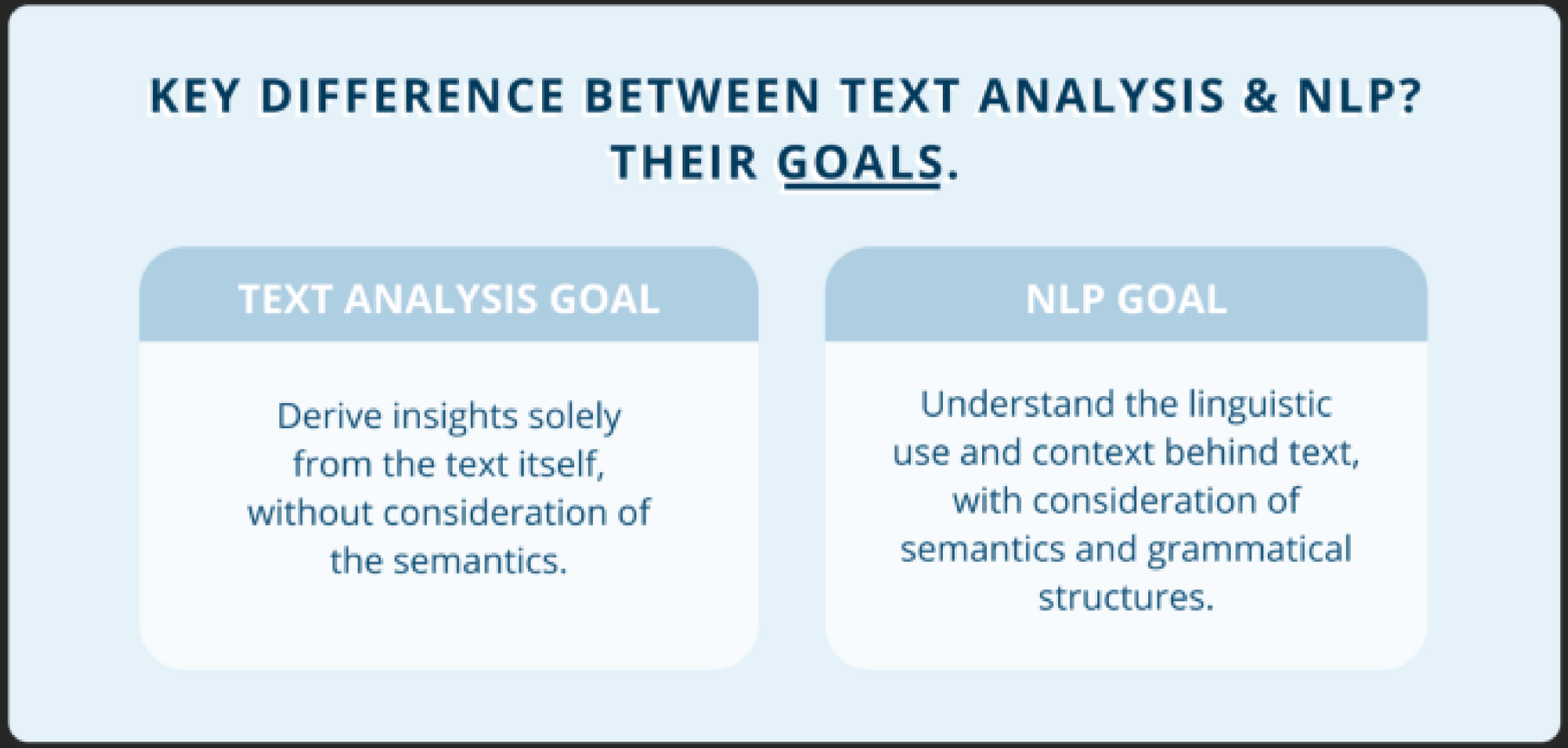
Process & Techniques



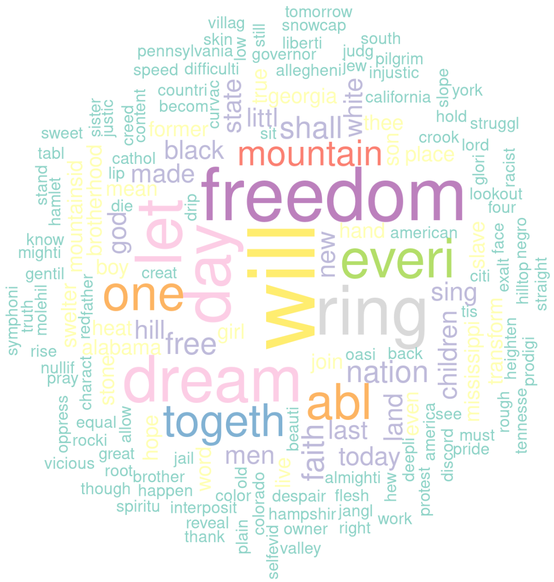
Process & Techniques

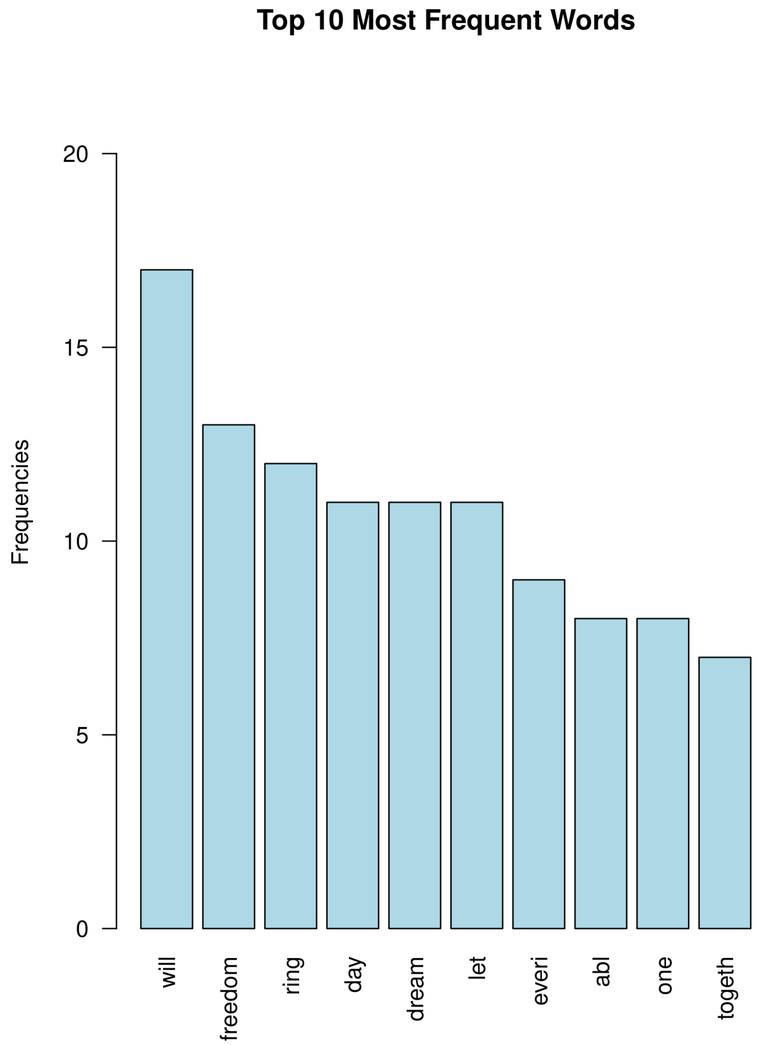


Goals

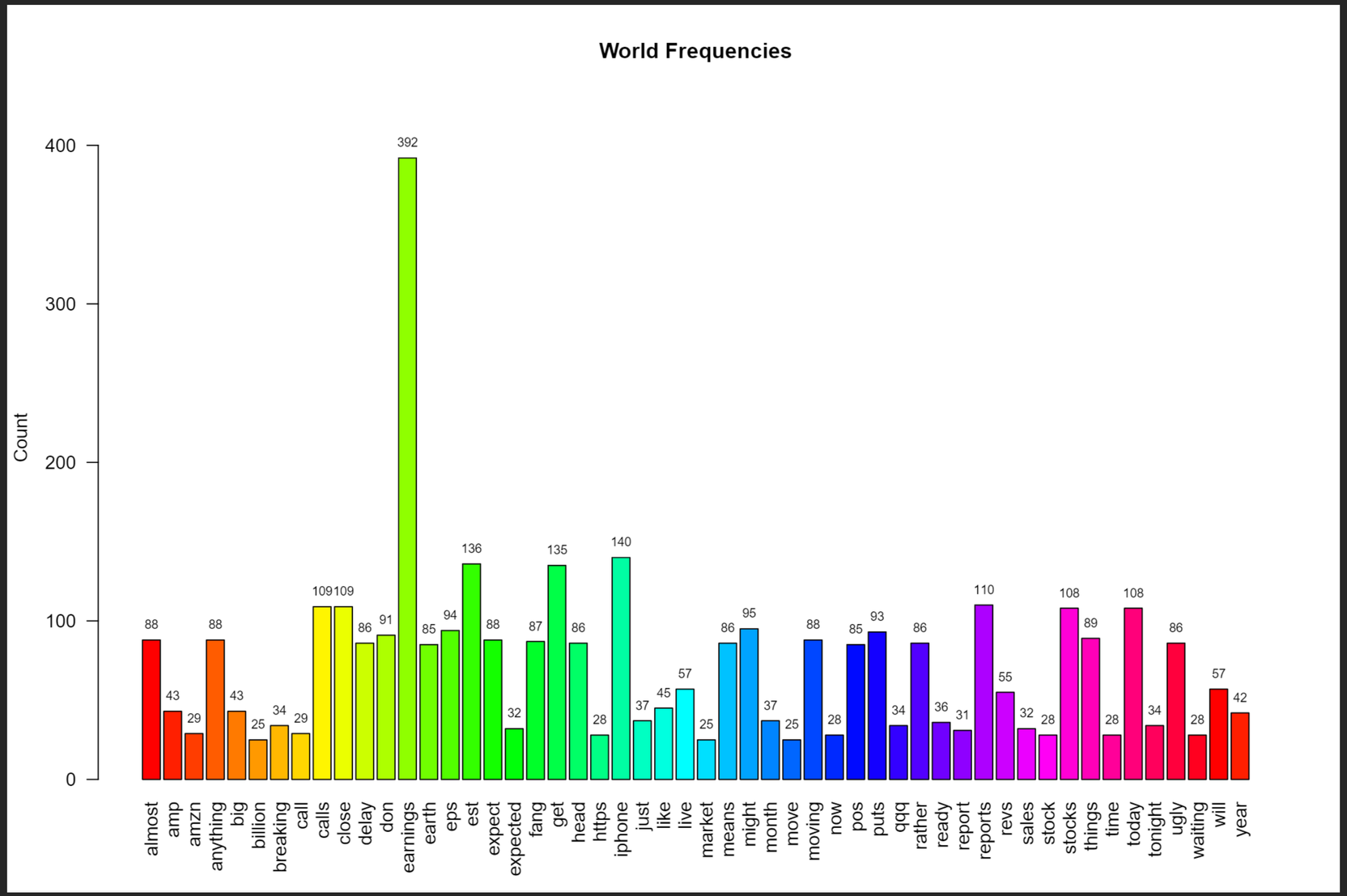

KEY DIFFERENCE BETWEEN TEXT ANALYSIS & NLP?
THEIR GOALS.
TEXT ANALYSIS GOAL
Derive insights solely from the text itself, without consideration of the semantics.
NLP GOAL
Understand the linguistic use and context behind text, with consideration of semantics and grammatical structures.

Example: Word Cloud & Word Frequency

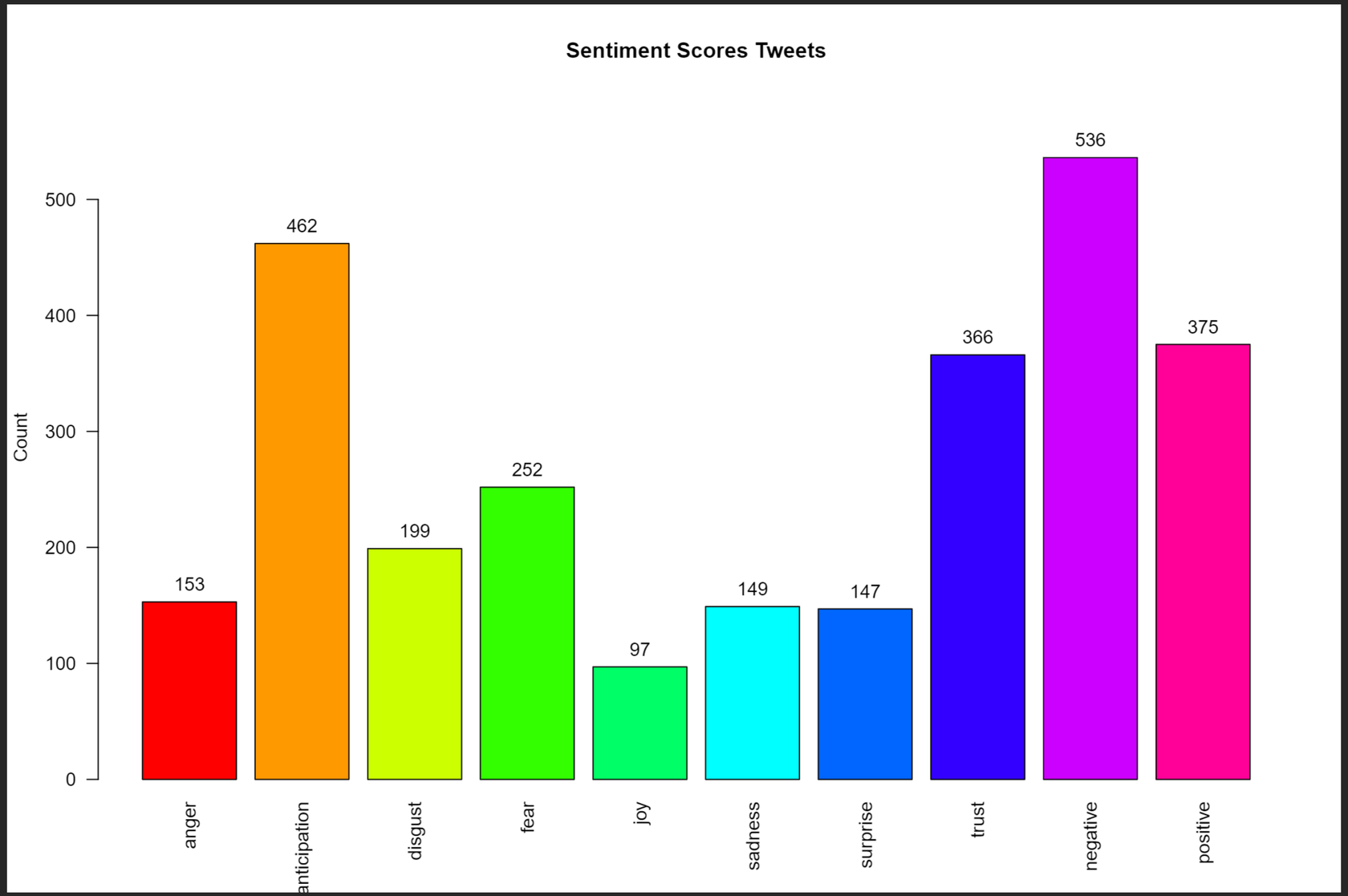




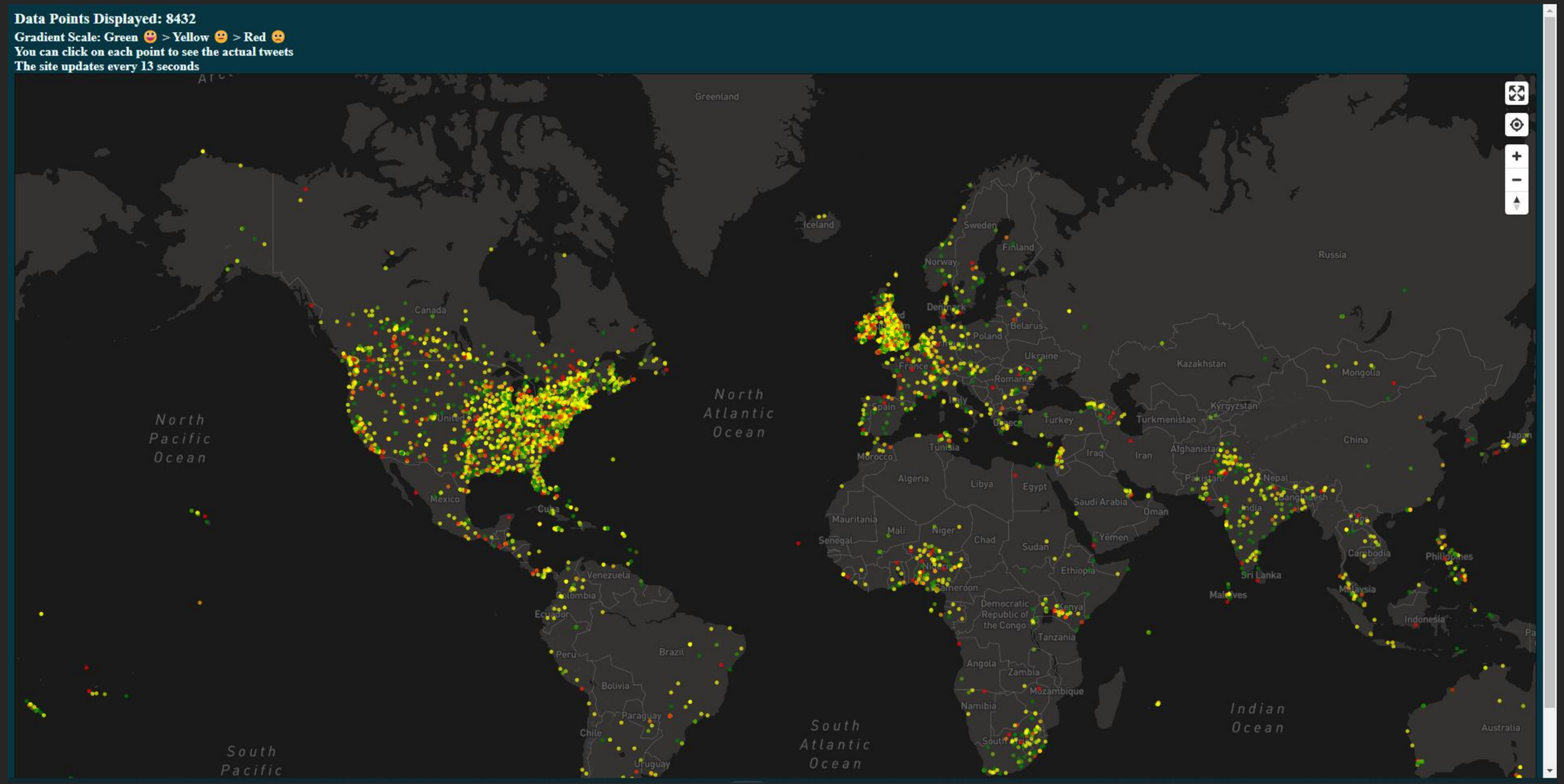
Example: Word Frequency + Sentiment Analysis



Example: Tweet Sentiment



Examples: Covid Sentiment Map



4 R Basics

R Basics

- **Data Types**
  - Character & Double & Integer & Logical & Complex
- **Data Structures**
  - Matrix & Data Frame
  - List & Vector
  - Factor
- **Variable Assignment**
  - x ← 1
  - y ← c(“apple”, ”orange”)
  - car_speeds <- read.csv(file = ‘./car-speeds.csv')
- **Accessing Data Frame**
  - Data_Frame[row, col]
  - Data_Frame$Column_Name

R Basics: Data Structure Examples

List

```
> x
[[1]]
[1] 1

[[2]]
[1] "a"

[[3]]
[1] TRUE

[[4]]
[1] 1+4i

>
```

Data Frame

```
> df
   id  x  y
1   a  1 11
2   b  2 12
3   c  3 13
4   d  4 14
5   e  5 15
6   f  6 16
7   g  7 17
8   h  8 18
9   i  9 19
10  j 10 20
>
```

Vector

```
> z
[1] "Sarah" "Tracy" "Jon"
> y
[1] 1 2 3
>
```

Matrix

```
> m
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]   11   12   13
>
```

R Basics: Exploring Your Data

- **nrow() & ncol()**
  - Gives you the number of rows of the dataset
  - Gives you the number of columns of the data set
- **head() & tail()**
  - Gives you the top 6 rows of the data set
  - Gives you the bottom 6 rows of the data set
- **str()**
  - Gives you the structure of the data set
- **dim()**
  - Gives you the dimension (row, col) of the data set
- **summary()**
  - Gives you a summary of your data set
  - Ex: min, max, mean, IQR, number of categorical variables …etc.

Let’s Code

Thank You