

# Chapter 1: Introduction to R

```
Terminal
R version 3.4.2 (2017-09-28) -- "Short Summer"
Copyright (C) 2017 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

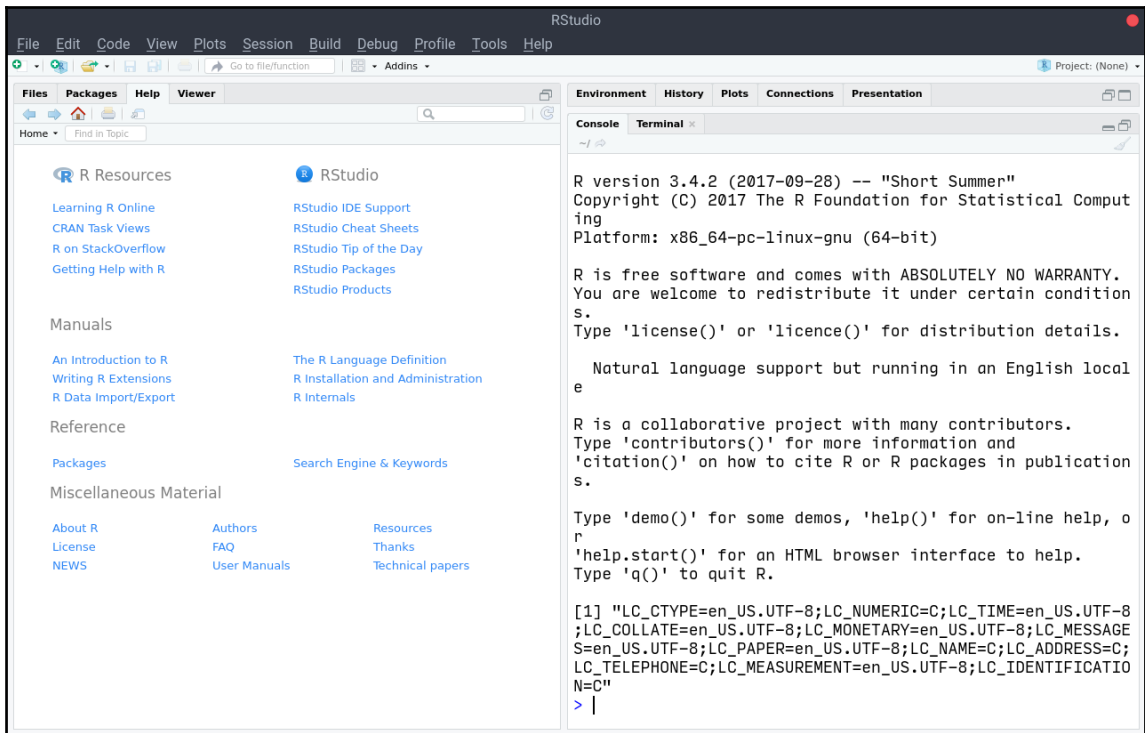
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[1] "LC_CTYPE=en_US.UTF-8;LC_NUMERIC=C;LC_TIME=en_US.UTF-8;LC_COLLATE=en_US.UTF-
8;LC_MONETARY=en_US.UTF-8;LC_MESSAGES=en_US.UTF-8;LC_PAPER=en_US.UTF-8;LC_NAME=C
;LC_ADDRESS=C;LC_TELEPHONE=C;LC_MEASUREMENT=en_US.UTF-8;LC_IDENTIFICATION=C"
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```

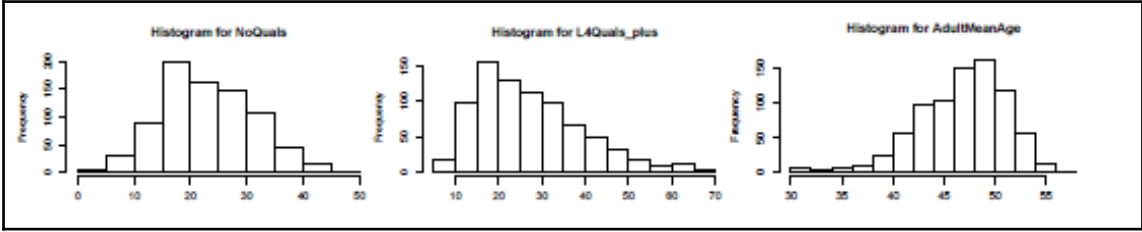
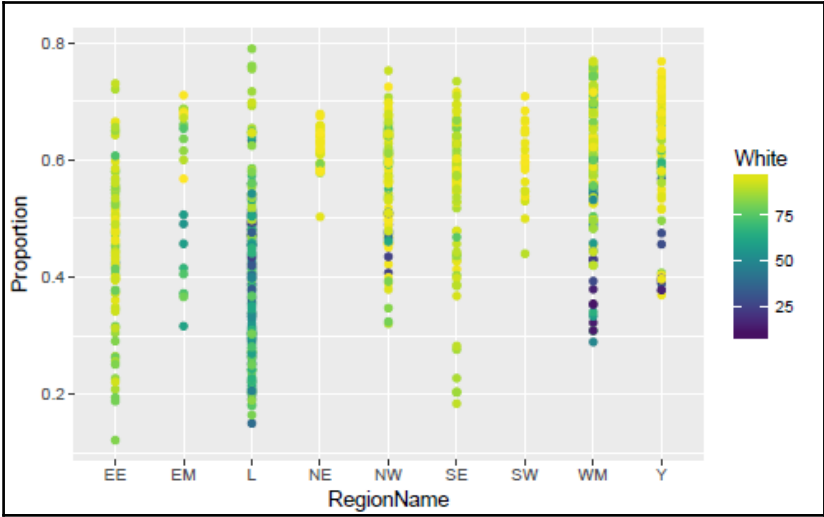
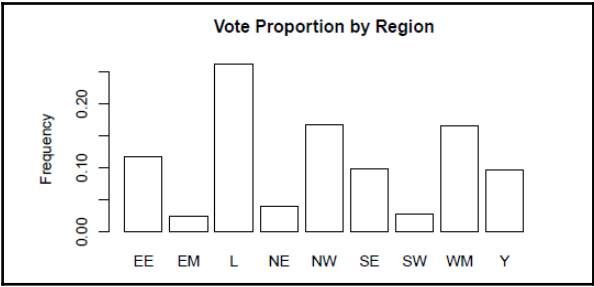


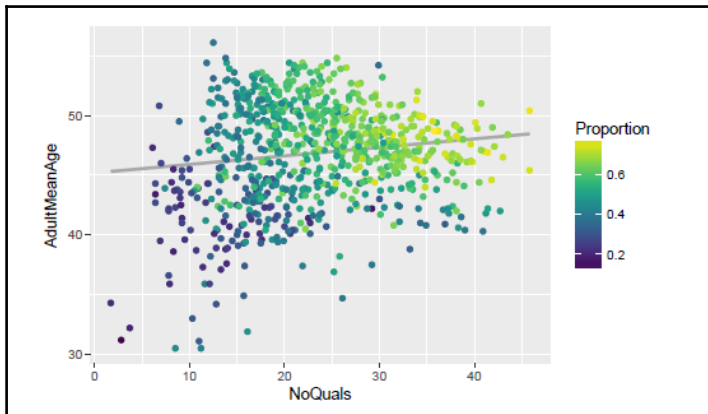
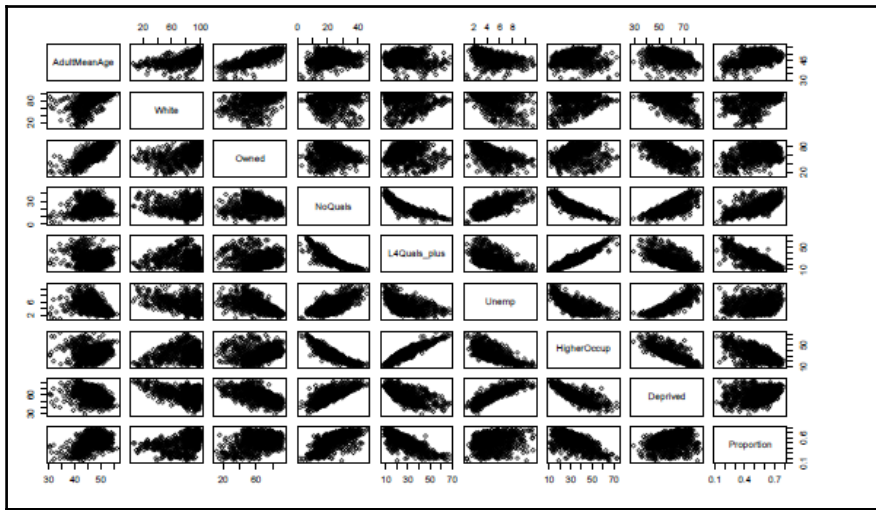
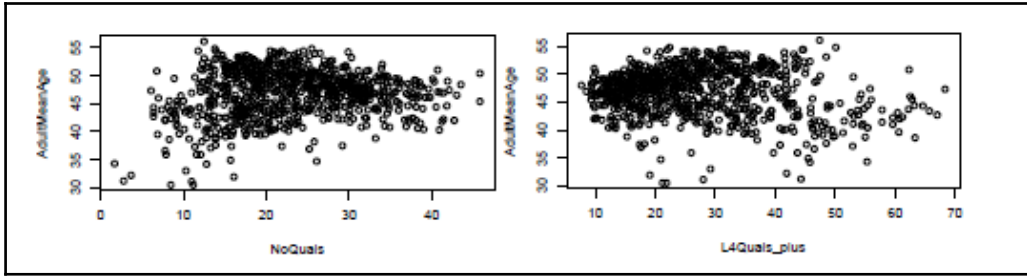
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"FALSE"	FALSE	1	TRUE
"false"	FALSE	0	FALSE
"F"	FALSE	-1	TRUE

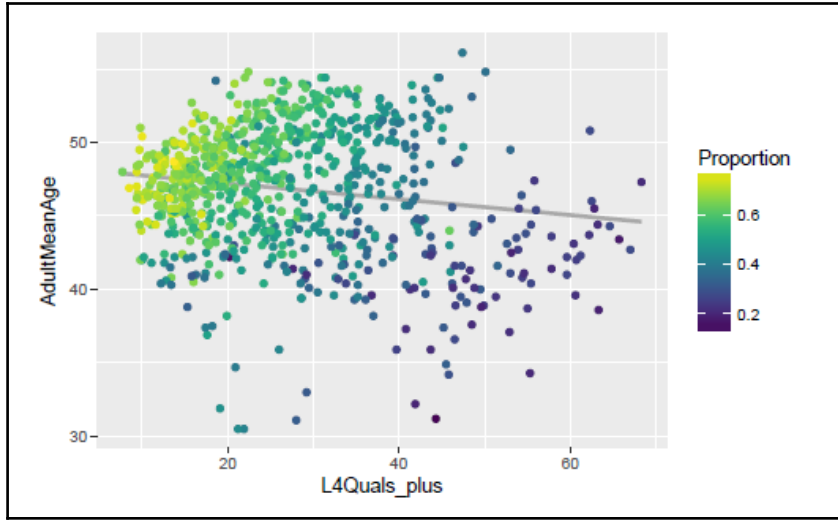
Dimensions	Homogeneous	Heterogeneous
1	Vector	List
2	Matrix	Data frame
n	Array	

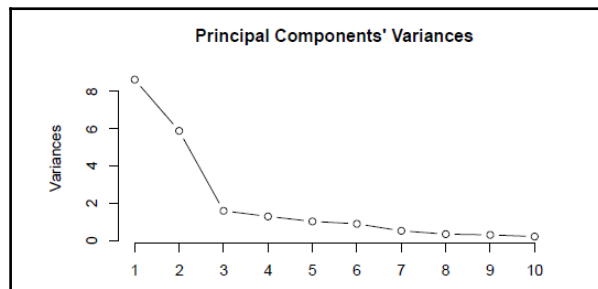
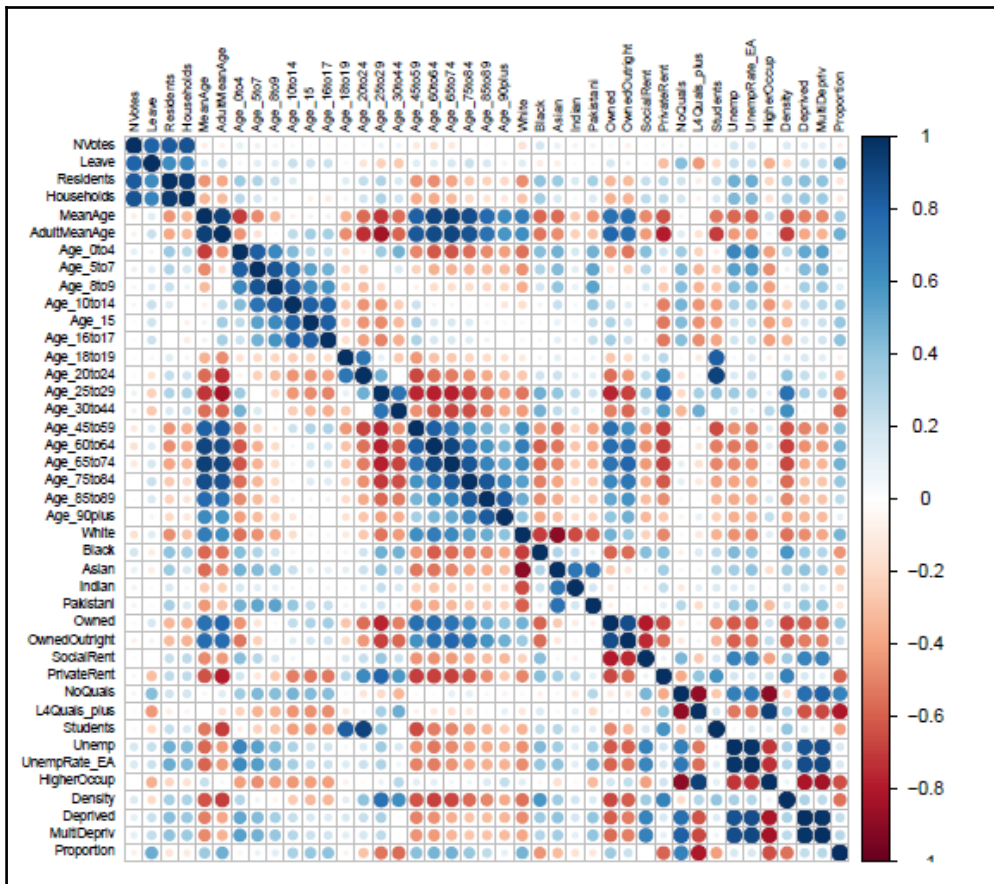
## Chapter 2: Understanding Votes with Descriptive Statistics

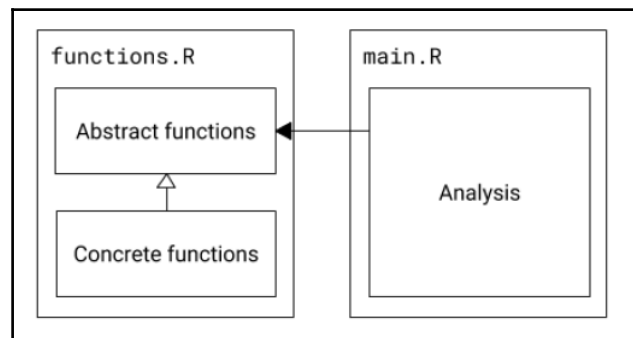
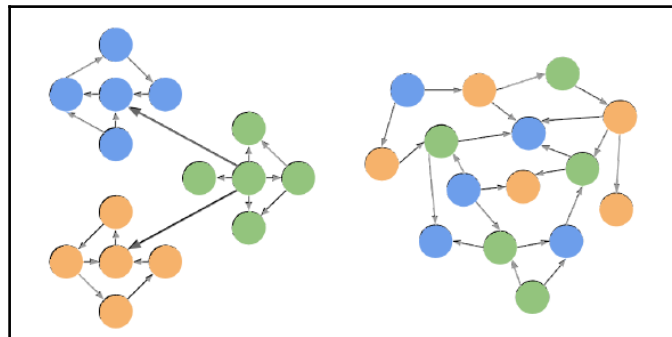
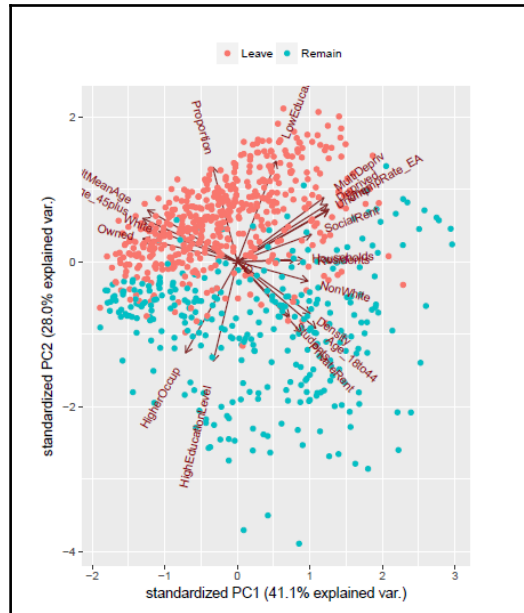
No.	Variable	Description
1	ID	Ward ID number from 1 to 1,070
2	RegionName	Name of the region within which the ward is situated
3	NVotes	Total number of votes ('Leave' + 'Remain')
4	Leave	Number of 'Leave' votes
5	Residents	Number of permanent residents
6	Household	Number of households
7	MeanAge	Mean age of permanent residents
8	AdultMeanAge	Mean age of adult permanent residents
9	Age_0to4	% of permanent residents aged 0-4
10	Age_5to7	% of permanent residents aged 5-7
11	Age_8to9	% of permanent residents aged 8-9
12	Age_10to14	% of permanent residents aged 10-14
13	Age_15	% of permanent residents aged 15
14	Age_16to17	% of permanent residents aged 16-17
15	Age_18to19	% of permanent residents aged 18-19
16	Age_20to24	% of permanent residents aged 20-24
17	Age_25to29	% of permanent residents aged 25-29
18	Age_30to44	% of permanent residents aged 30-44
19	Age_45to59	% of permanent residents aged 45-59
20	Age_60to64	% of permanent residents aged 60-64
21	Age_65to74	% of permanent residents aged 65-74
22	Age_75to84	% of permanent residents aged 75-84
23	Age_85to89	% of permanent residents aged 85-89
24	Age_90plus	% of permanent residents aged 90 and above
25	White	% of permanent residents self-identifying as white
26	Black	% of permanent residents self-identifying as black
27	Asian	% of permanent residents self-identifying as Asian
28	Indian	% of permanent residents self-identifying as Indian
29	Pakistani	% of permanent residents self-identifying as Pakistani
30	Owned	% of households owning their accommodation
31	OwnedOutright	% of households owning their accommodation without mortgage
32	SocialRent	% of households renting from social landlords
33	PrivateRent	% of households renting from private landlords
34	NoQuals	% of permanent residents with no academic qualifications
35	L4Quals_plus	% of permanent residents with a degree education or above
36	Students	% of permanent residents who are students
37	Unemp	% of permanent residents who are unemployed
38	UnempRate_EA	% of economically active residents who are unemployed
39	HigherOccup	% permanent residents in 'higher-level' occupations
40	Density	Population density (permanent residents per hectare)
41	Deprived	% of households that are 'deprived' in at least one of four dimensions
42	MultiDeprived	% of households that are 'deprived' in at least two of four dimensions







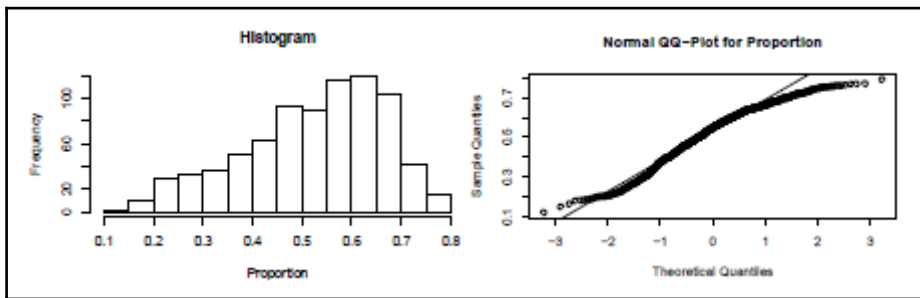
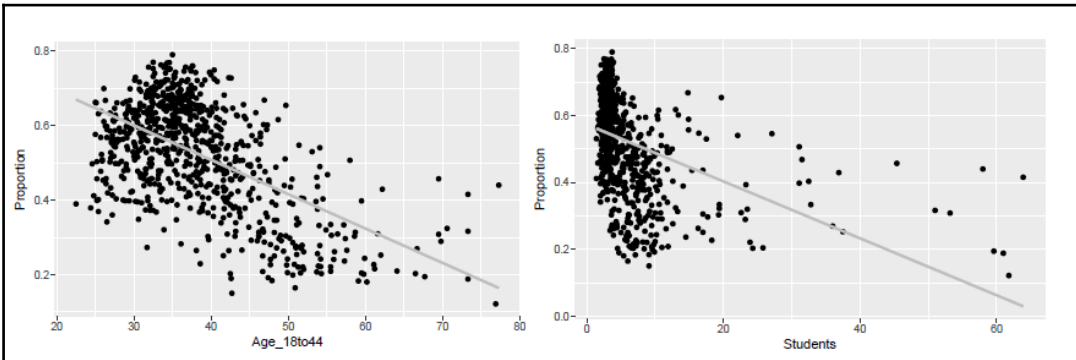


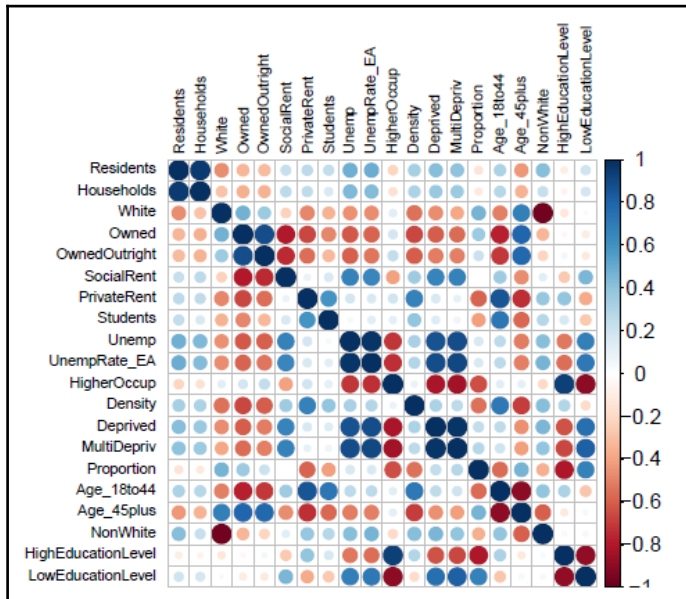
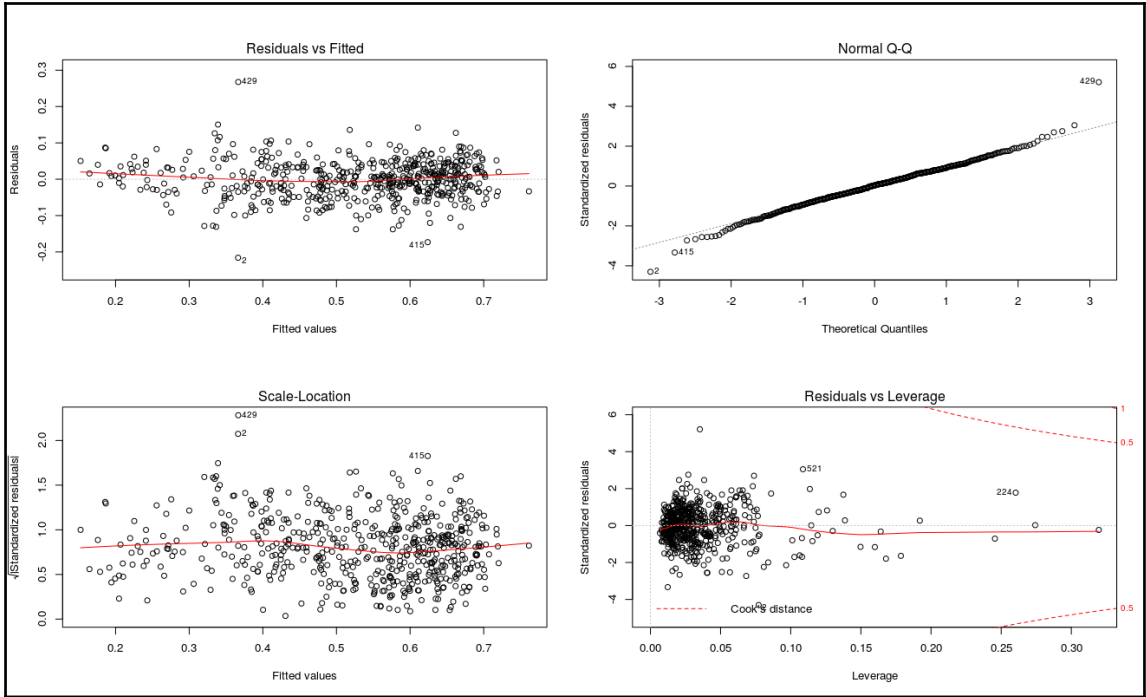




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# Chapter 3: Predicting Votes with Linear Models



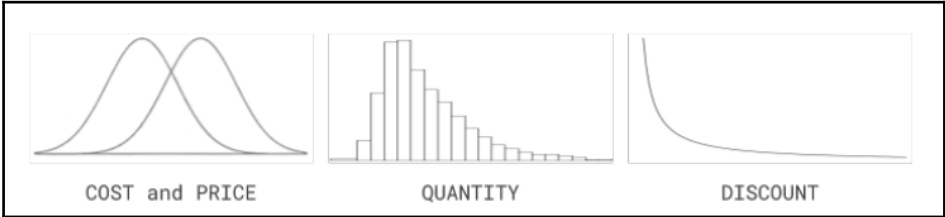
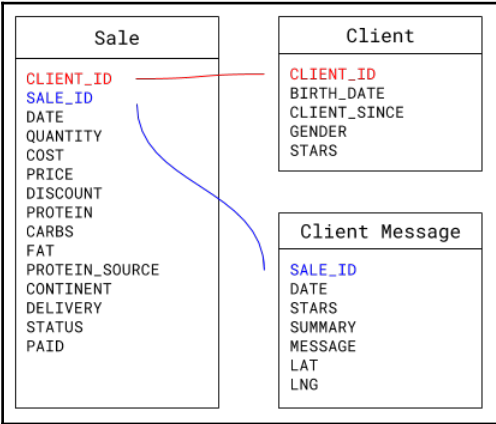


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$$S = \frac{\sum_{i=1}^n \frac{(Y_i - Y_i')^2}{SE_i^2}}{n}$$

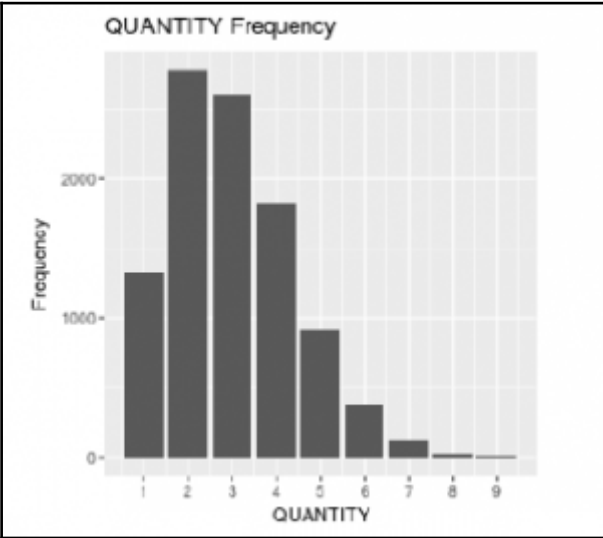
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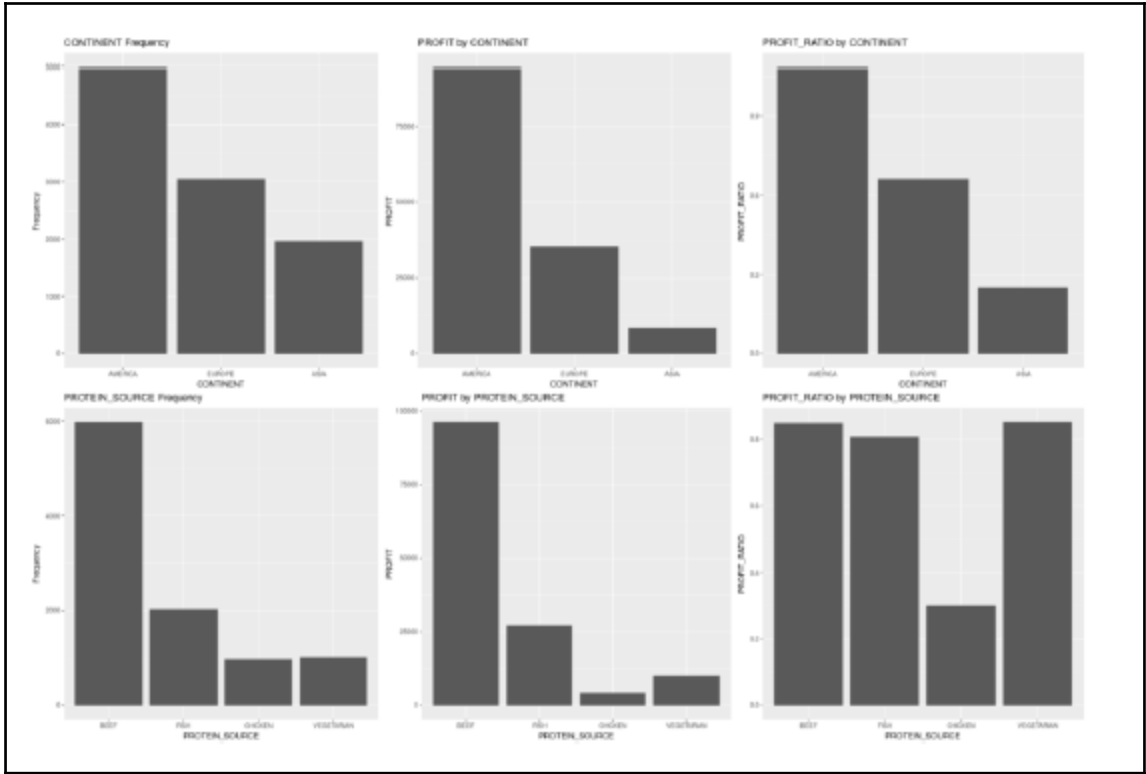
# Chapter 4: Simulating Sales Data and Working with Databases

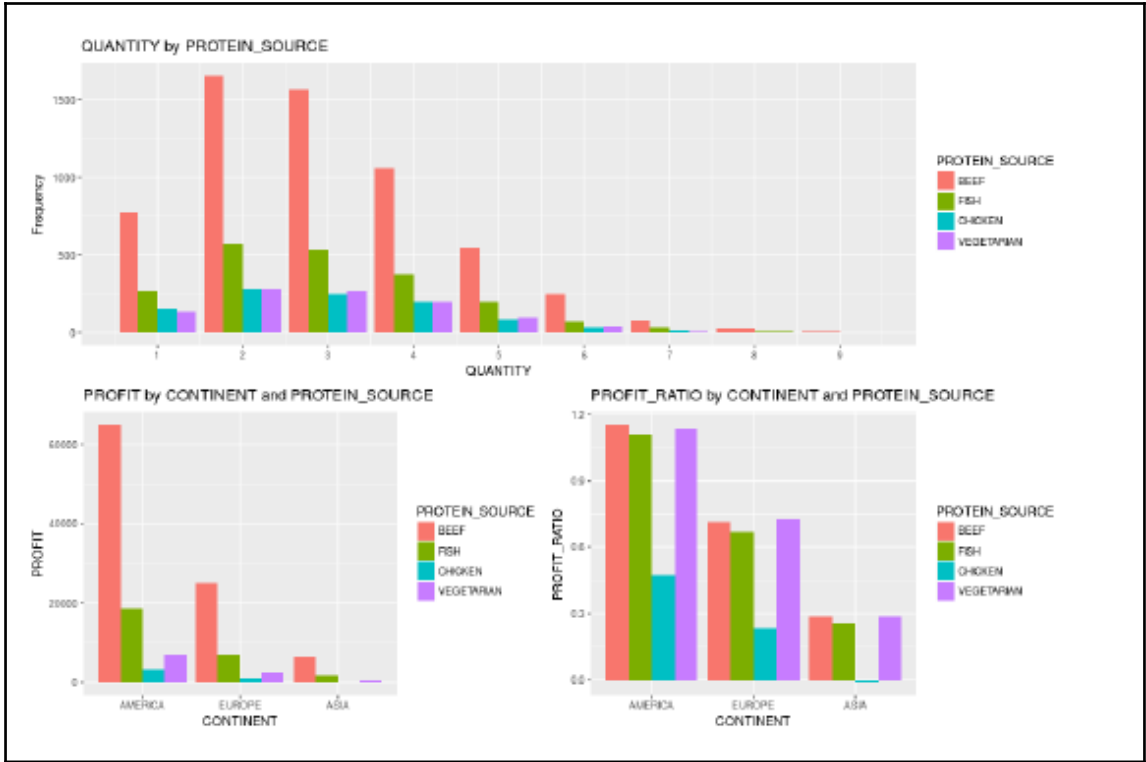


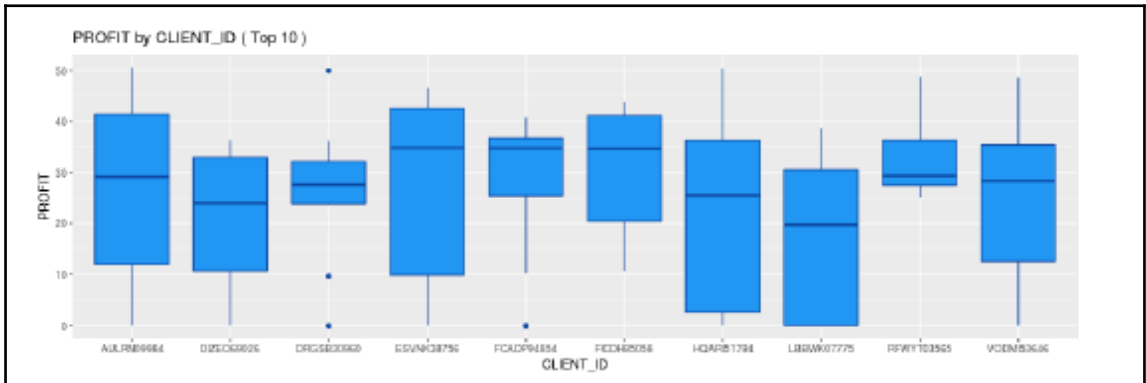
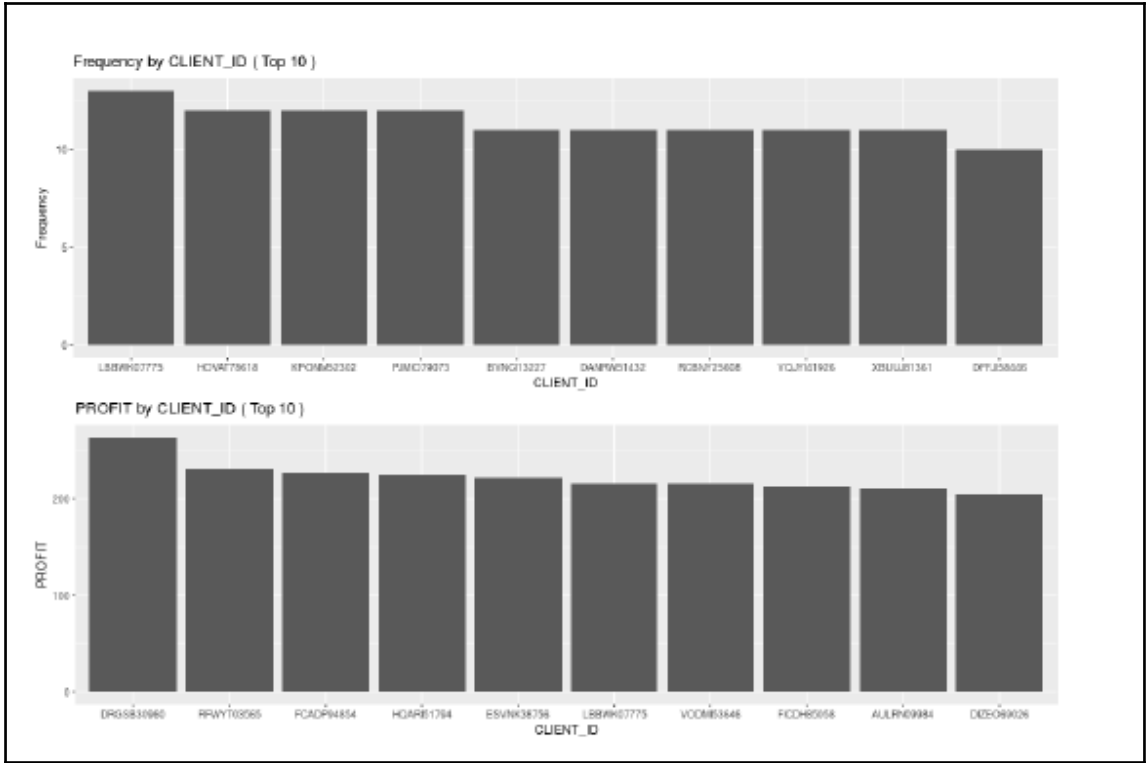
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# Chapter 5: Communicating Sales with Visualizations

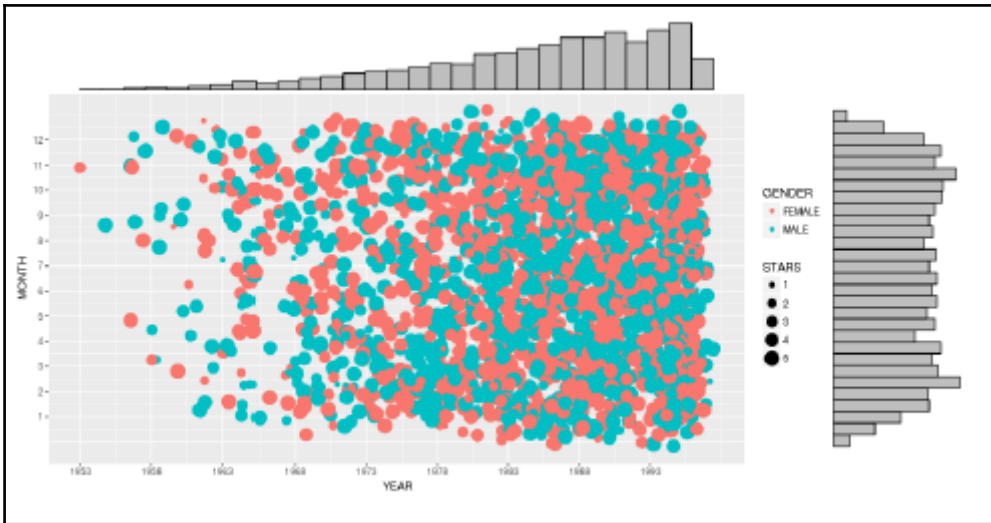
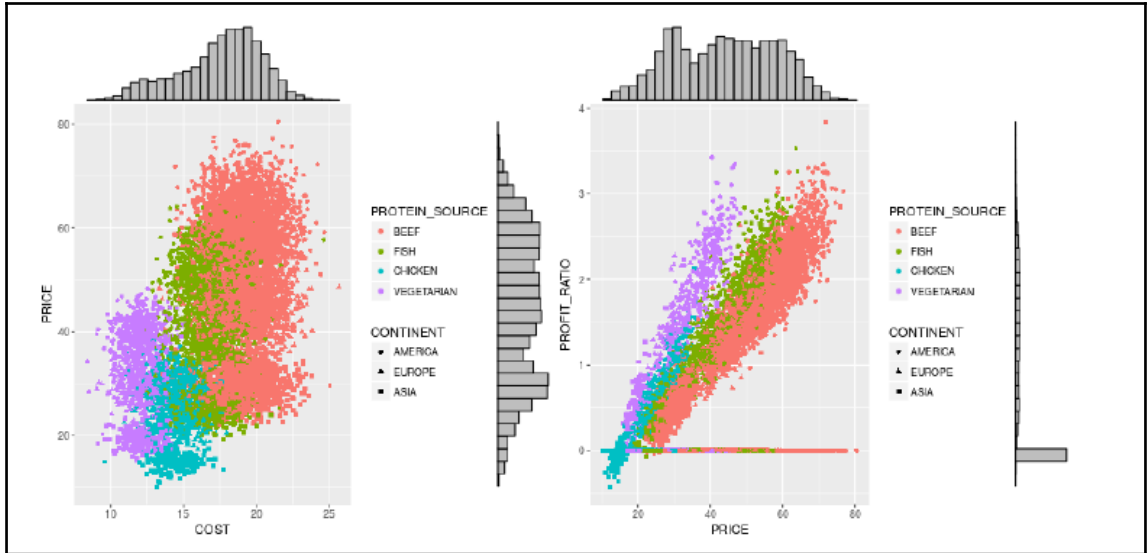


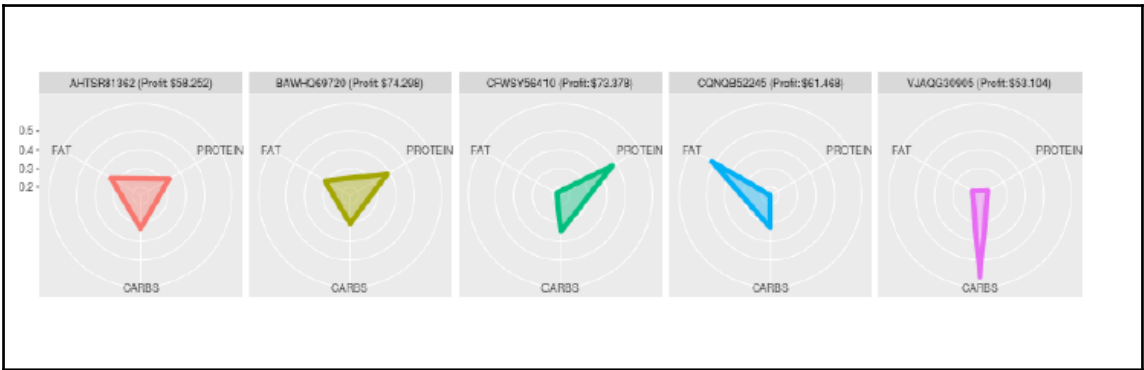
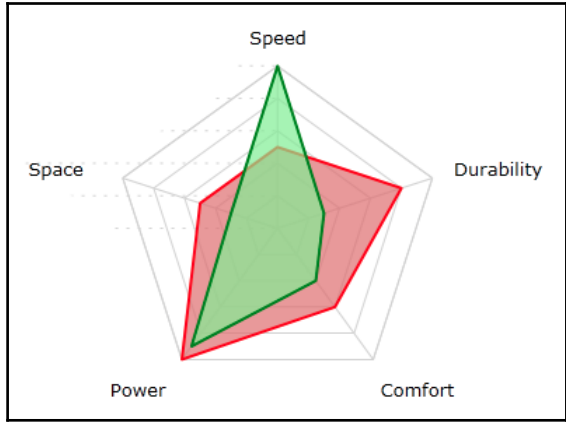


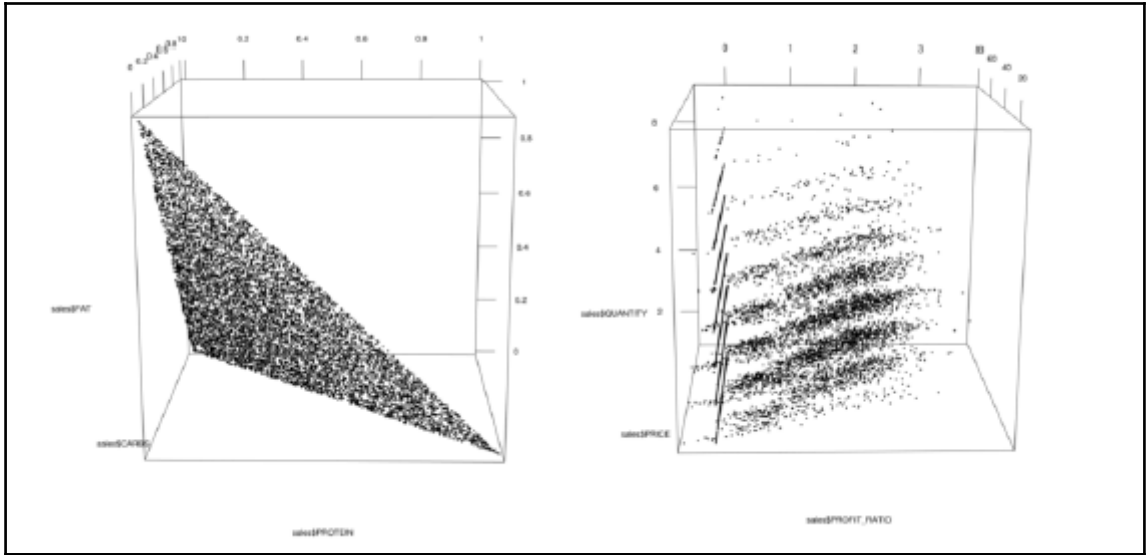


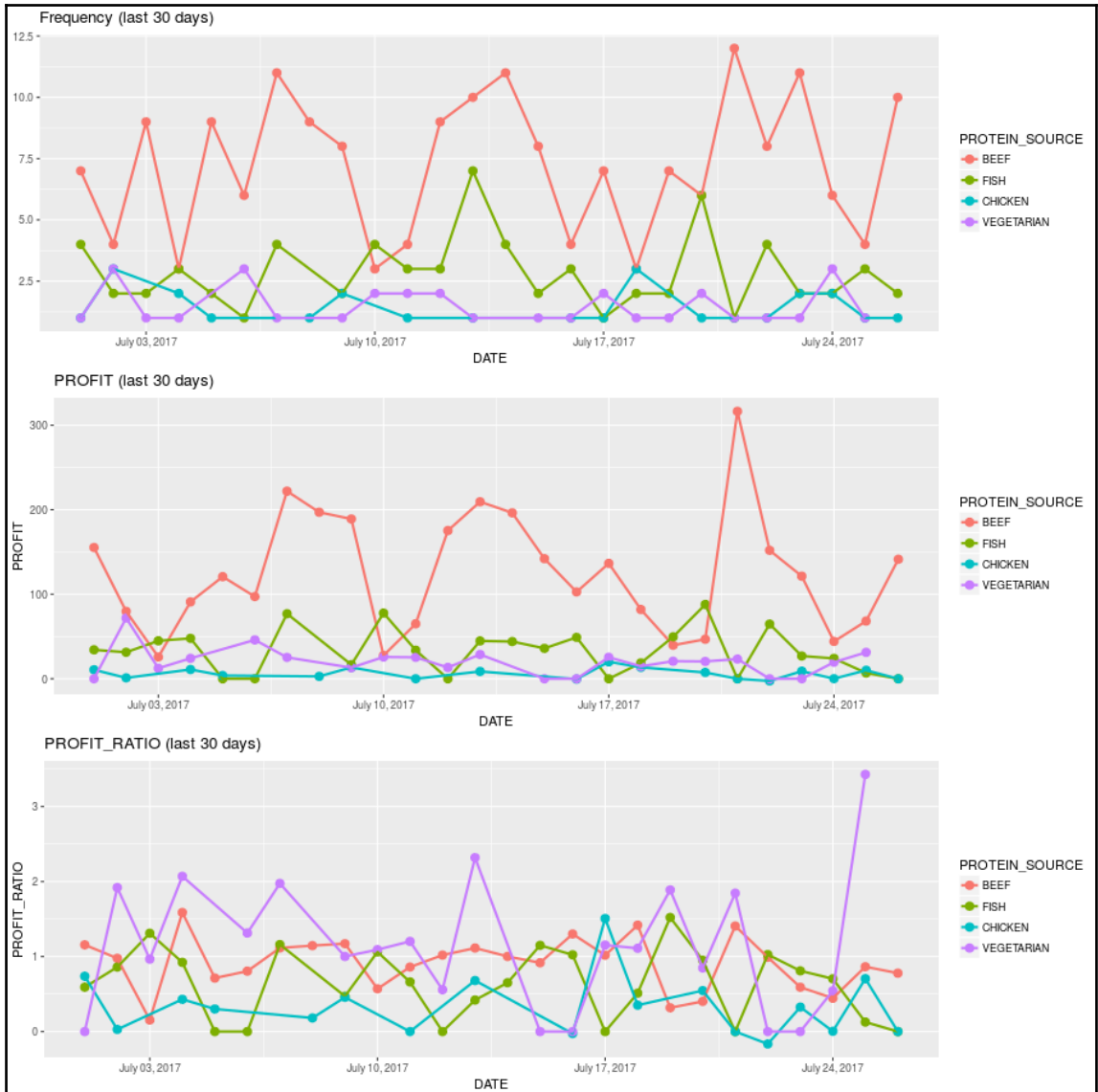


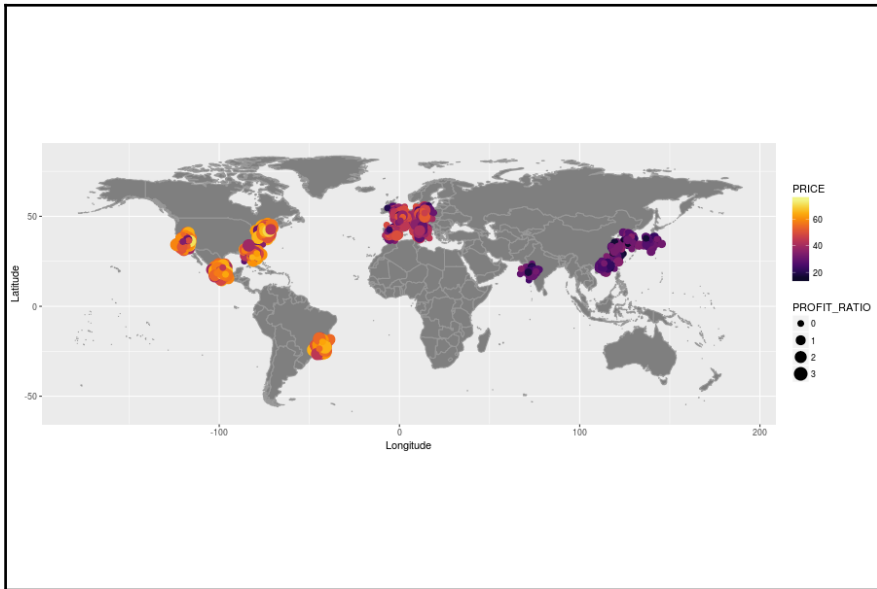
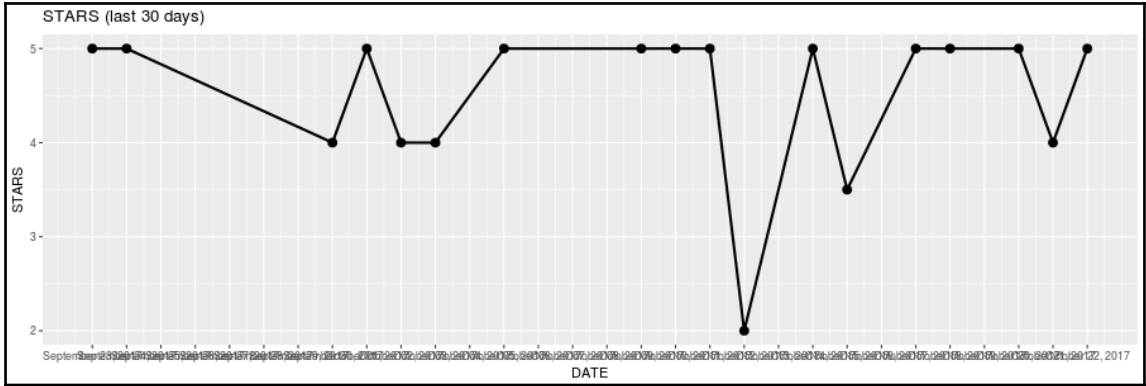


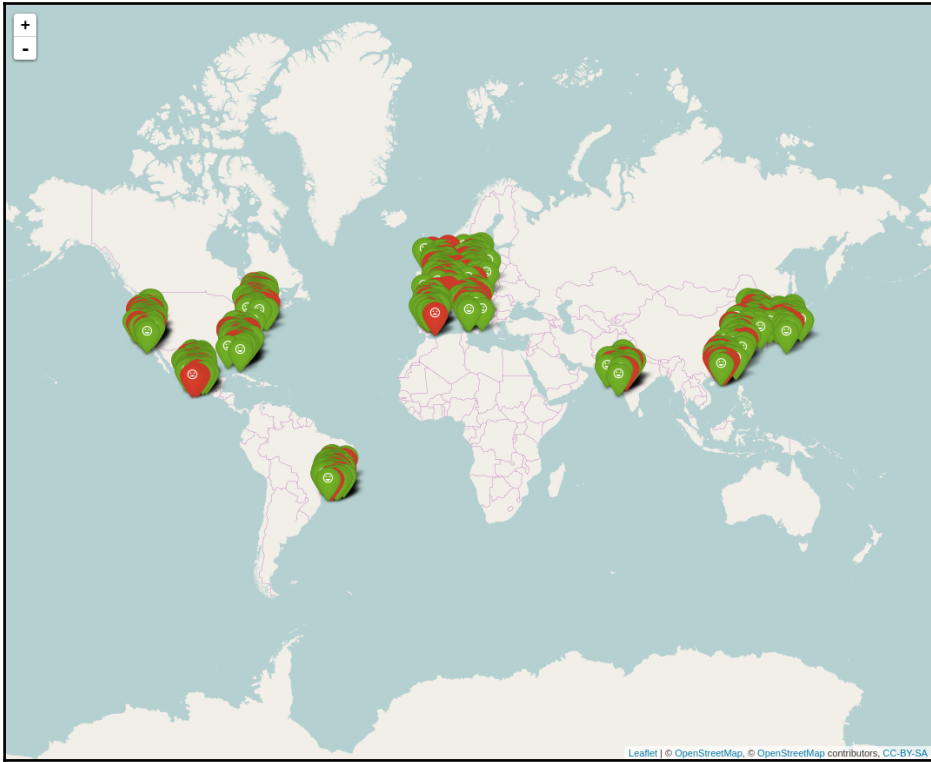


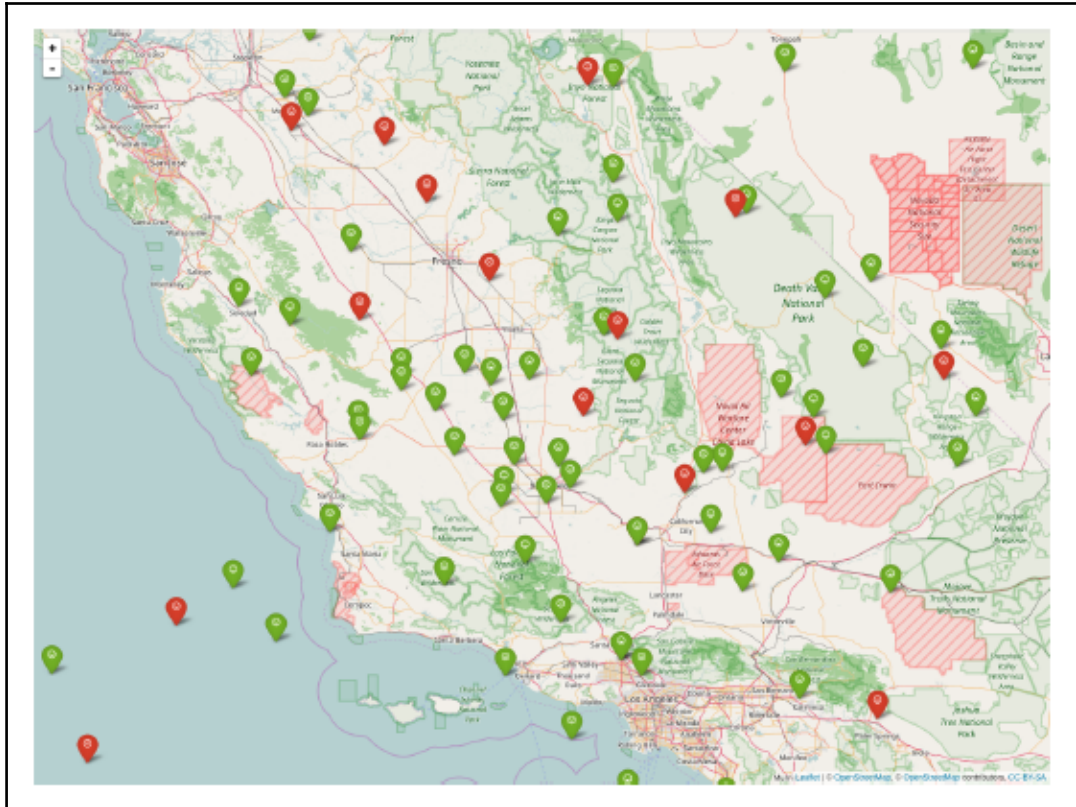


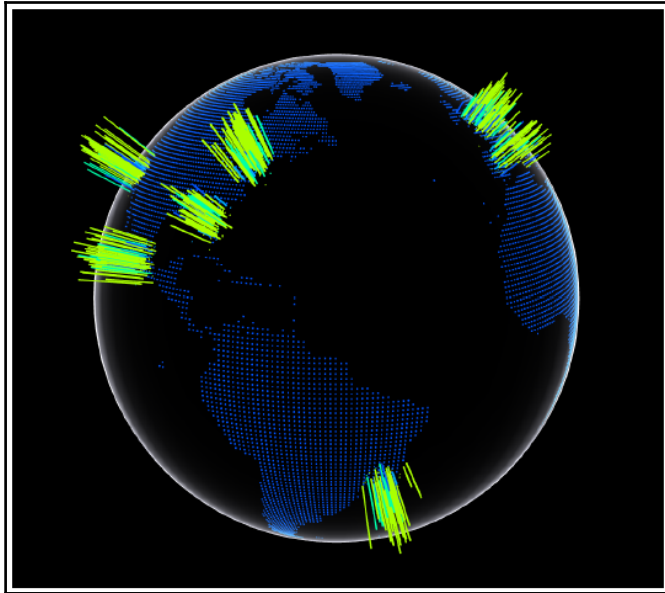






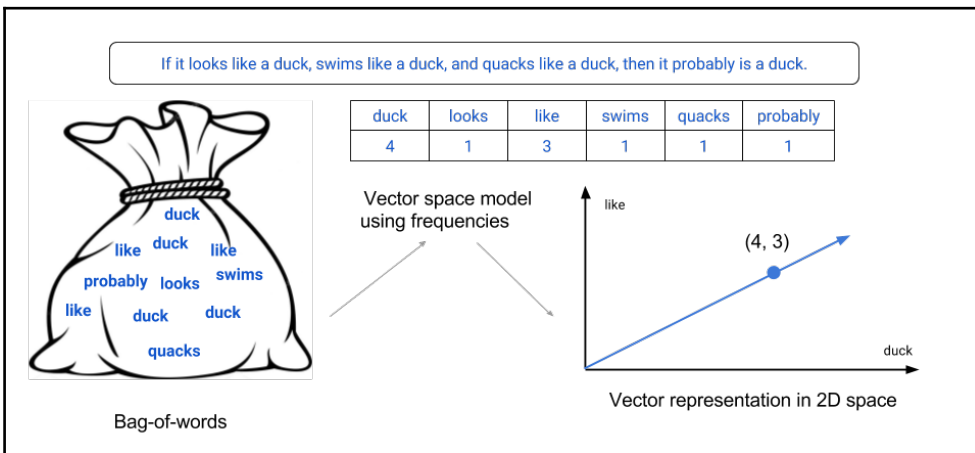
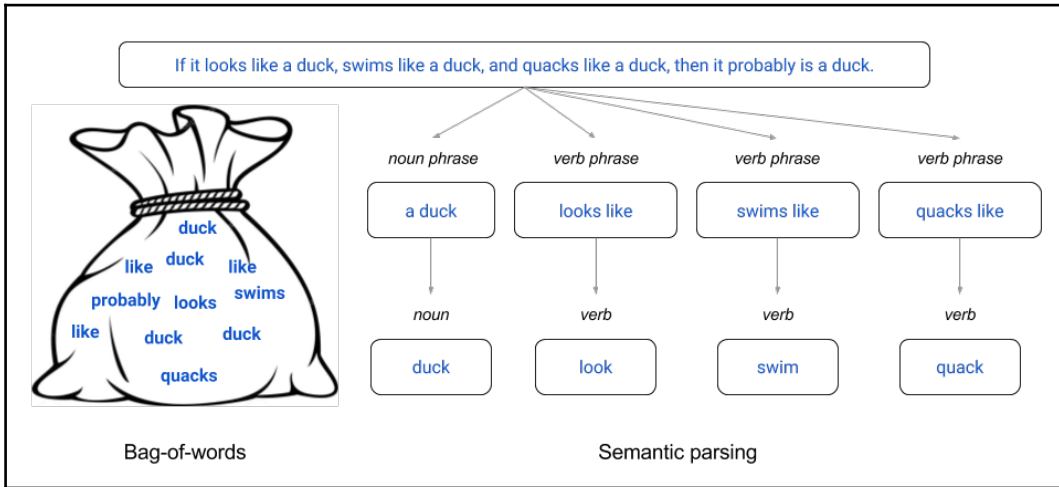


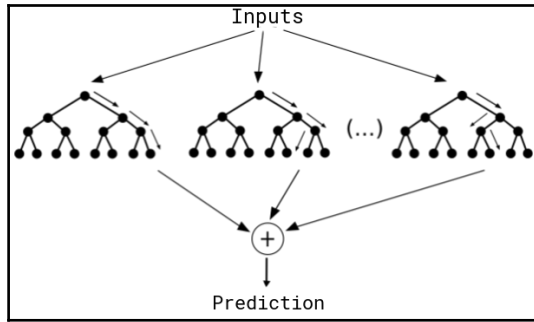






# Chapter 6: Understanding Reviews with Text Analysis

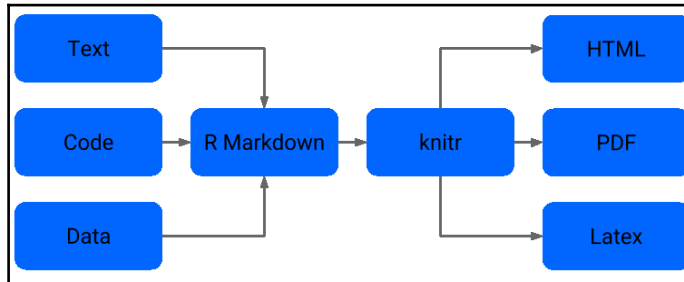




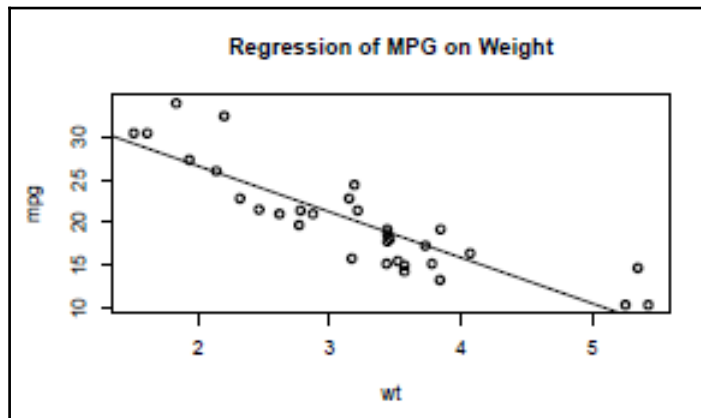
$$\text{cosine\_similarity}(V1, V2) = \frac{V1 \cdot V2}{\|V1\|_2 \|V2\|_2}$$

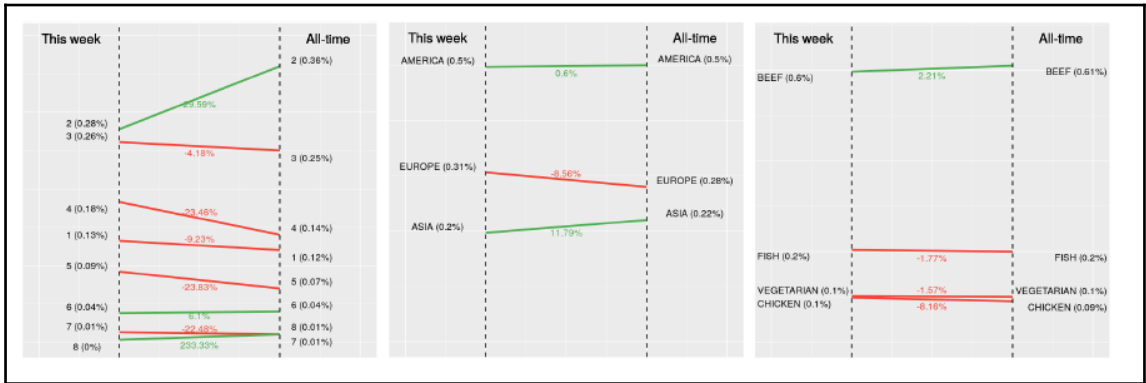
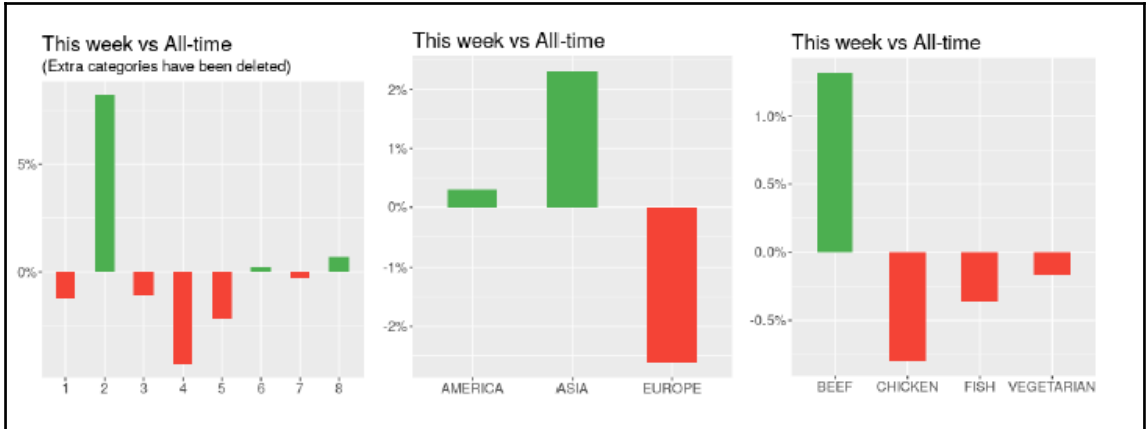
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# Chapter 7: Developing Automatic Presentations



$$\Theta = \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}$$





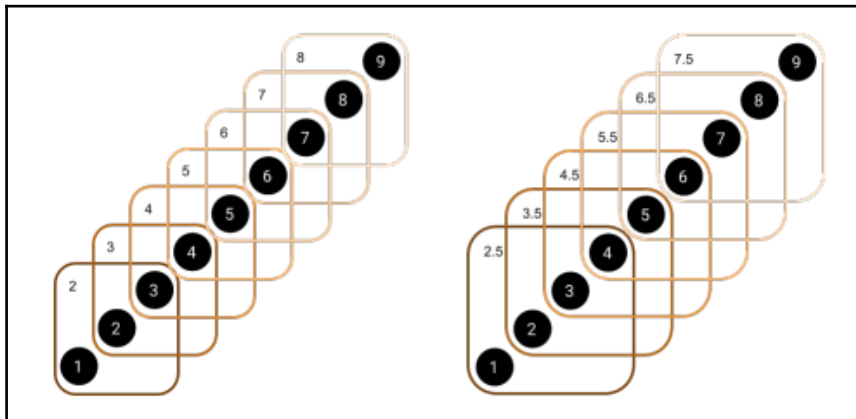
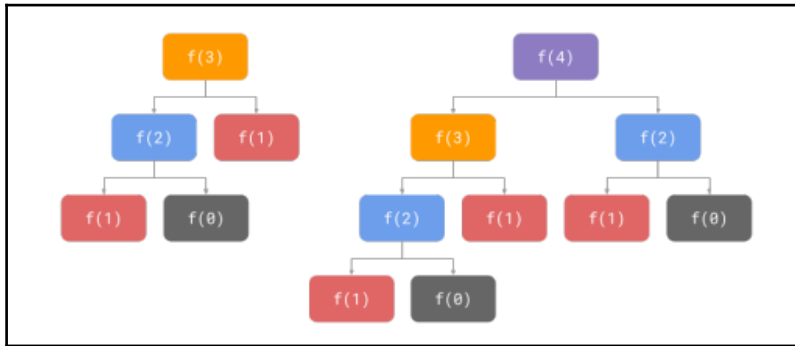
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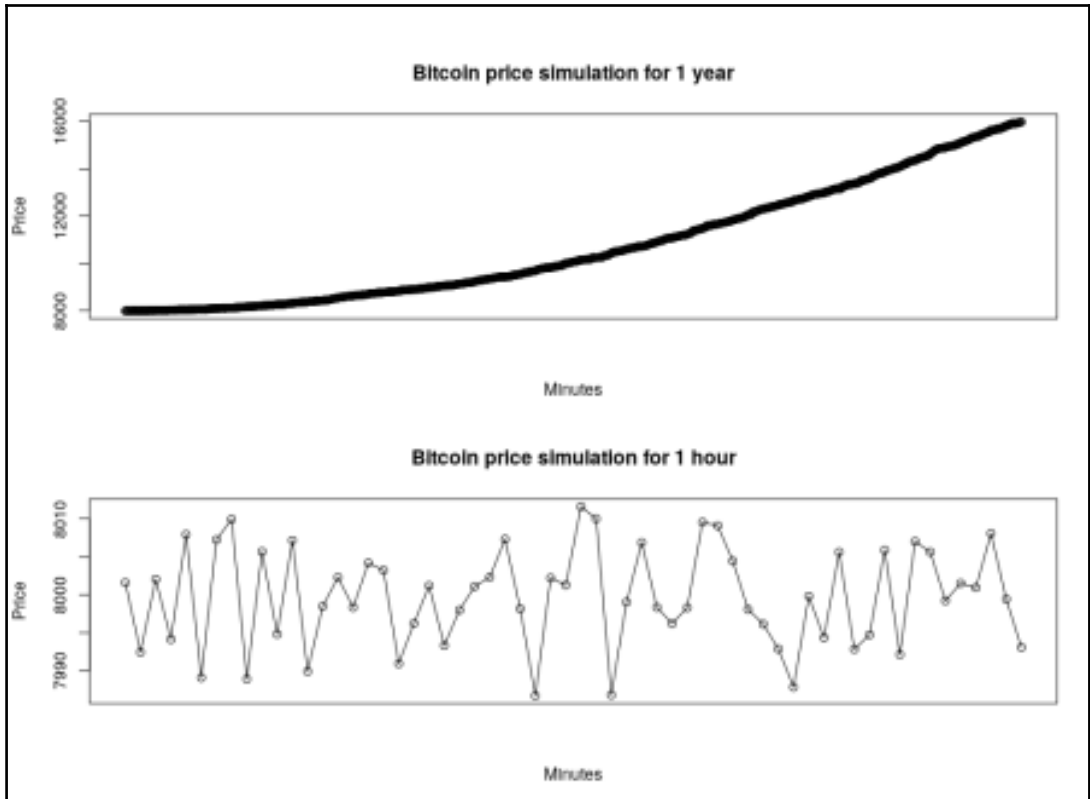
# Chapter 8: Object-Oriented System to Track Cryptocurrencies



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# Chapter 9: Implementing an Efficient Simple Moving Average





Fastest	Implementation	Microseconds Median	% From Fastest
	sma_slow_1	81,035.1900	34,013.74 %
	sma_slow_2	33,031.7785	13,865.77 %
	sma_slow_3	19,628.2430	8,238.76 %
	sma_slow_4	20,825.8790	8,741.46 %
	sma_slow_5	16,682.6800	7,002.39 %
	sma_slow_6	2,991.5720	1,255.68 %
	sma_slow_7	910.7930	382.29 %
	sma_efficient_1	1,137.7040	477.54 %
⇒	sma_efficient_2	238.2425	100 %
	sma_parallel_inefficient	1,197,329.3980	50,2567.50 %

Fastest	Implementation	Microseconds Median	% From Fastest
	sma_slow_1	81,035.1900	34,013.74 %
	sma_slow_2	33,031.7785	13,865.77 %
	sma_slow_3	19,628.2430	8,238.76 %
	sma_slow_4	20,825.8790	8,741.46 %
	sma_slow_5	16,682.6800	7,002.39 %
	sma_slow_6	2,991.5720	1,255.68 %
	sma_slow_7	910.7930	382.29 %
	sma_efficient_1	1,137.7040	477.54 %
⇒	sma_efficient_2	238.2425	100 %
	sma_parallel_inefficient	1,197,329.3980	50,2567.50 %
	sma_parallel	44,825.9355	18,815.25 %

Fastest	Implementation	Microseconds Median	% From Fastest
	sma_slow_1	81,035.1900	54,741.11 %
	sma_slow_2	33,031.7785	22,313.71 %
	sma_slow_3	19,628.2430	13,259.32 %
	sma_slow_4	20,825.8790	14,068.35 %
	sma_slow_5	16,682.6800	11,269.79 %
	sma_slow_6	2,991.5720	2,020.87 %
	sma_slow_7	910.7930	615.26 %
	sma_efficient_1	1,137.7040	768.54 %
	sma_efficient_2	238.2425	160.93 %
	sma_parallel_inefficient	1,197,329.3980	808,823.26 %
	sma_parallel	44,825.9355	30,280.94 %
⇒	sma_delegated_fortran	148.0335	100 %



# Chapter 10: Adding Interactivity with Dashboards

Cryptocurrency Markets

Options

Content

Cryptocurrency Markets

Options

Simple Moving Averages

Data Overview

Content 1

Cryptocurrency Markets

Options

Simple Moving Averages

Data Overview

Show 10 entries

Search:

	timestamp	price_usd	name	symbol	time
1	2016-11-25-22-40	8001.6062974042	Bitcoin	BTC	2016-11-26T04:40:00Z
2	2016-11-25-22-40	79.9163231769014	Litecoin	LTC	2016-11-26T04:40:00Z
3	2016-11-25-22-41	7992.44989015548	Bitcoin	BTC	2016-11-26T04:41:00Z
4	2016-11-25-22-41	80.0444226381146	Litecoin	LTC	2016-11-26T04:41:00Z
5	2016-11-25-22-42	8002.0523361121	Bitcoin	BTC	2016-11-26T04:42:00Z
6	2016-11-25-22-42	80.0910438238982	Litecoin	LTC	2016-11-26T04:42:00Z
7	2016-11-25-22-43	7994.14326405321	Bitcoin	BTC	2016-11-26T04:43:00Z
8	2016-11-25-22-43	80.0704493802652	Litecoin	LTC	2016-11-26T04:43:00Z
9	2016-11-25-22-44	8007.94489387388	Bitcoin	BTC	2016-11-26T04:44:00Z
10	2016-11-25-22-44	79.9570534513624	Litecoin	LTC	2016-11-26T04:44:00Z

Showing 1 to 10 of 1,051,200 entries

Previous 1 2 3 4 5 ... 105120 Next

## Cryptocurrency Markets

Date range:  to

Simple Moving Averages | Data Overview

Show **10** entries Search:

timestamp	price_usd	name	symbol	time
1 2016-11-25-22-40	8001.6062974042	Bitcoin	BTC	2016-11-26T04:40:00Z
2 2016-11-25-22-40	79.9163231769014	Litecoin	LTC	2016-11-26T04:40:00Z
3 2016-11-25-22-41	7992.44989015548	Bitcoin	BTC	2016-11-26T04:41:00Z
4 2016-11-25-22-41	80.0444226381146	Litecoin	LTC	2016-11-26T04:41:00Z
5 2016-11-25-22-42	8002.0523361121	Bitcoin	BTC	2016-11-26T04:42:00Z
6 2016-11-25-22-42	80.0910438238982	Litecoin	LTC	2016-11-26T04:42:00Z
7 2016-11-25-22-43	7994.14326405321	Bitcoin	BTC	2016-11-26T04:43:00Z
8 2016-11-25-22-43	80.0704493802652	Litecoin	LTC	2016-11-26T04:43:00Z
9 2016-11-25-22-44	8007.94489387388	Bitcoin	BTC	2016-11-26T04:44:00Z
10 2016-11-25-22-44	79.9570534513624	Litecoin	LTC	2016-11-26T04:44:00Z

Showing 1 to 10 of 77,922 entries Previous **1** 2 3 4 5 ... 7793 Next

## Cryptocurrency Markets

Date range:  to

Simple Moving Averages | Data Overview

Show **10** entries Search:

Asset:

timestamp	price_usd	name	symbol	time
1 2016-11-25-22-40	8001.6062974042	Bitcoin	BTC	2016-11-26T04:40:00Z
2 2016-11-25-22-40	79.9163231769014	Litecoin	LTC	2016-11-26T04:40:00Z
3 2016-11-25-22-41	7992.44989015548	Bitcoin	BTC	2016-11-26T04:41:00Z
4 2016-11-25-22-41	80.0444226381146	Litecoin	LTC	2016-11-26T04:41:00Z
5 2016-11-25-22-42	8002.0523361121	Bitcoin	BTC	2016-11-26T04:42:00Z
6 2016-11-25-22-42	80.0910438238982	Litecoin	LTC	2016-11-26T04:42:00Z
7 2016-11-25-22-43	7994.14326405321	Bitcoin	BTC	2016-11-26T04:43:00Z
8 2016-11-25-22-43	80.0704493802652	Litecoin	LTC	2016-11-26T04:43:00Z
9 2016-11-25-22-44	8007.94489387388	Bitcoin	BTC	2016-11-26T04:44:00Z
10 2016-11-25-22-44	79.9570534513624	Litecoin	LTC	2016-11-26T04:44:00Z

Showing 1 to 10 of 1,051,200 entries Previous **1** 2 3 4 5 ... 105120 Next

## Cryptocurrency Markets

**Date range:**  
 to

**Asset:**

**Implementation:**

- C++
- Fortran
- Efficient 1
- Efficient 2

**Period:**

Simple Moving Averages [Data Overview](#)

Content 1

## Cryptocurrency Markets

**Date range:**  
 to

**Asset:**

Simple Moving Averages [Data Overview](#)

Minimum	Median	Mean	Max
7973.86	8000.00	8000.00	8026.22

Show  entries

Search:

	timestamp	price_usd	name	symbol	time
1	2016-11-25-22-40	8001.6062974042	Bitcoin	BTC	2016-11-26T04:40:00Z
3	2016-11-25-22-41	7992.44989015548	Bitcoin	BTC	2016-11-26T04:41:00Z
5	2016-11-25-22-42	8002.0523361121	Bitcoin	BTC	2016-11-26T04:42:00Z
7	2016-11-25-22-43	7994.14326405321	Bitcoin	BTC	2016-11-26T04:43:00Z
9	2016-11-25-22-44	8007.94489387388	Bitcoin	BTC	2016-11-26T04:44:00Z
11	2016-11-25-22-45	7989.10032724468	Bitcoin	BTC	2016-11-26T04:45:00Z
13	2016-11-25-22-46	8007.24893741796	Bitcoin	BTC	2016-11-26T04:46:00Z
15	2016-11-25-22-47	8009.94751838961	Bitcoin	BTC	2016-11-26T04:47:00Z
17	2016-11-25-22-48	7988.92314077006	Bitcoin	BTC	2016-11-26T04:48:00Z
19	2016-11-25-22-49	8005.68819034741	Bitcoin	BTC	2016-11-26T04:49:00Z

Showing 1 to 10 of 1,521 entries

Previous  2 3 4 5 ... 153 Next

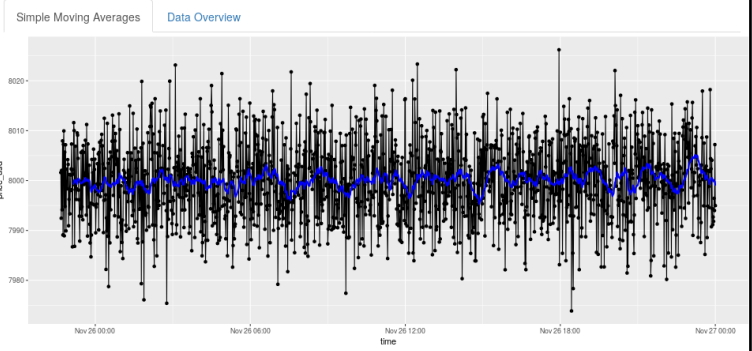
# Cryptocurrency Markets

**Date range:**  
2016-11-25 to 2016-11-27

**Asset:**  
Bitcoin

**Implementation:**  
 C++  
 Fortran  
 Efficient 1  
 Efficient 2

**Period:**  
5 30 200



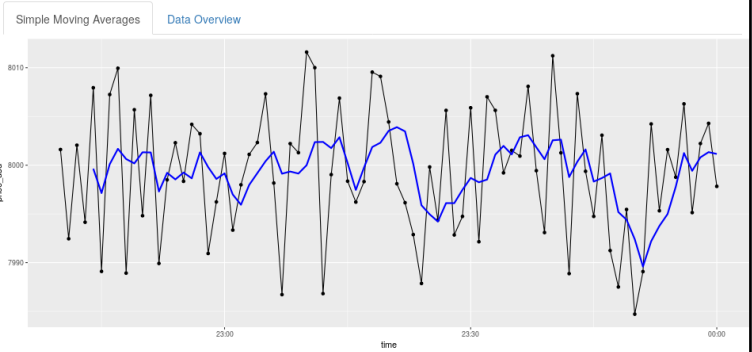
# Cryptocurrency Markets

**Date range:**  
2016-11-25 to 2016-11-26

**Asset:**  
Bitcoin

**Implementation:**  
 C++  
 Fortran  
 Efficient 1  
 Efficient 2

**Period:**  
5 30 200



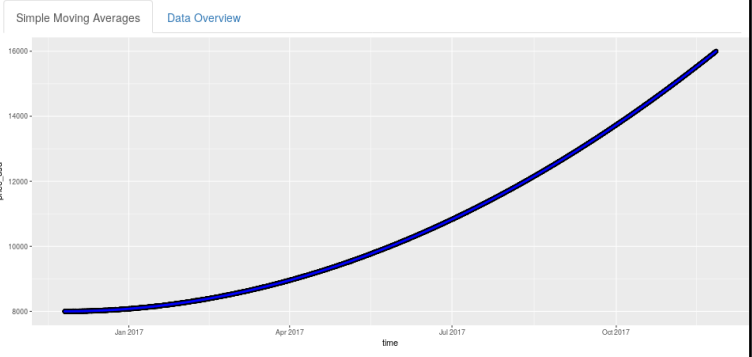
# Cryptocurrency Markets

**Date range:**  
2016-11-25 to 2017-11-25

**Asset:**  
Bitcoin

**Implementation:**  
 C++  
 Fortran  
 Efficient 1  
 Efficient 2

**Period:**  
5 10 25 45 65 85 105 125 145 165 185 200



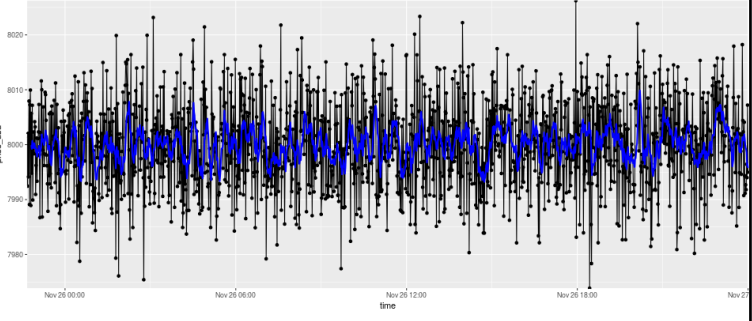
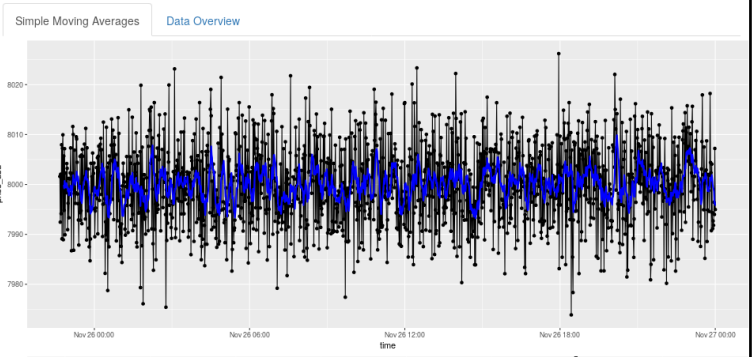
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5 10 25 45 65 85 105 125 145 165 185 200



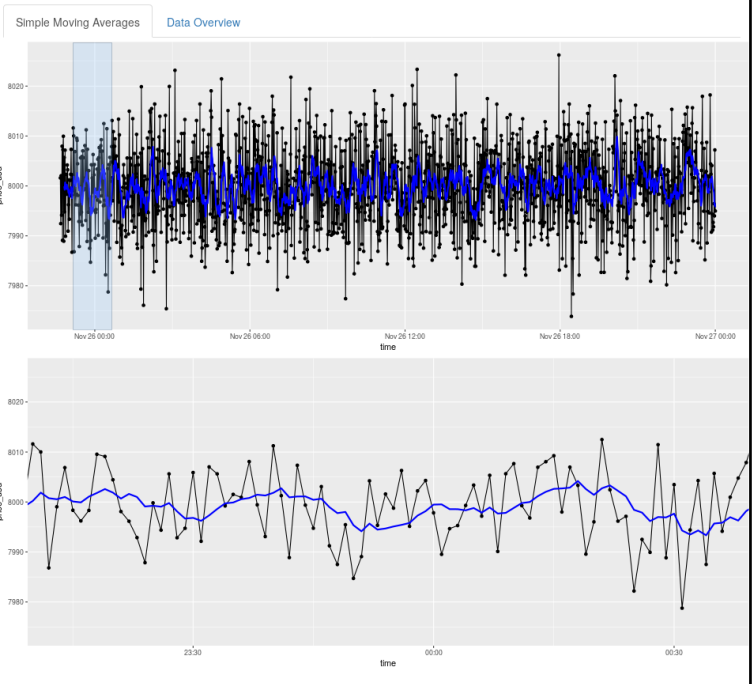
# Cryptocurrency Markets

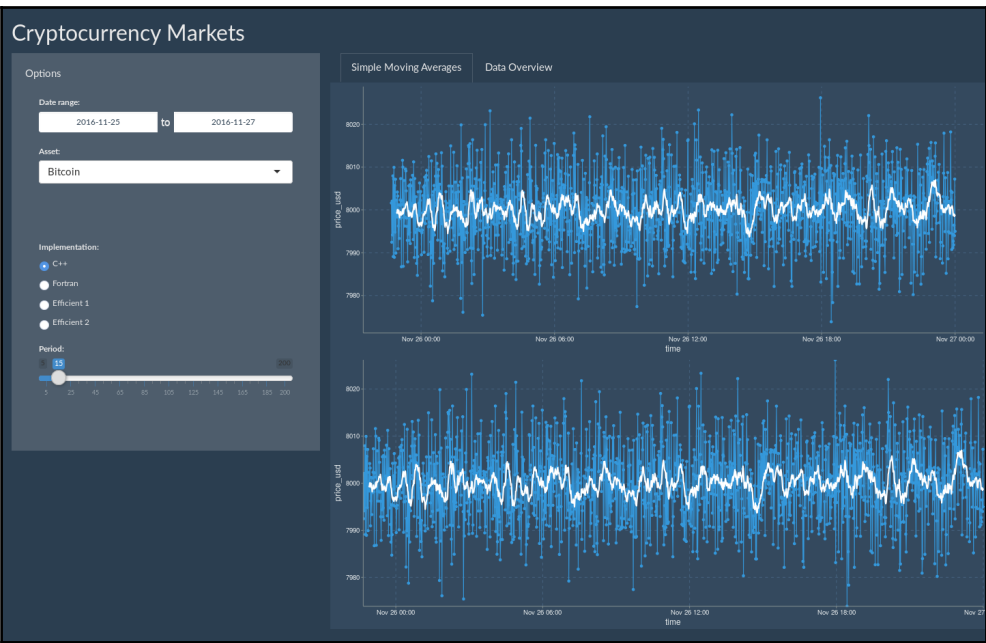
**Date range:**  
2016-11-25 to 2016-11-27

**Asset:**  
Bitcoin

**Implementation:**  
 C++  
 Fortran  
 Efficient 1  
 Efficient 2

**Period:**  
10 200





# Cryptocurrency Markets

## Options

Date range:

2016-11-25 to 2016-11-27

Asset:

All

## Simple Moving Averages

## Data Overview

Minimum Median Mean Max  
79.77 4040.00 4040.00 8026.22

Show 10 entries

Search:

	timestamp	price_usd	name	symbol	time
1	2016-11-25-22-40	8001.6062974042	Bitcoin	BTC	2016-11-26T04:40:00Z
2	2016-11-25-22-40	79.9163231769014	Litecoin	LTC	2016-11-26T04:40:00Z
3	2016-11-25-22-41	7992.44989015548	Bitcoin	BTC	2016-11-26T04:41:00Z
4	2016-11-25-22-41	80.0444226381146	Litecoin	LTC	2016-11-26T04:41:00Z
5	2016-11-25-22-42	8002.0523361121	Bitcoin	BTC	2016-11-26T04:42:00Z
6	2016-11-25-22-42	80.0910438238982	Litecoin	LTC	2016-11-26T04:42:00Z
7	2016-11-25-22-43	7994.14326405321	Bitcoin	BTC	2016-11-26T04:43:00Z
8	2016-11-25-22-43	80.0704493802652	Litecoin	LTC	2016-11-26T04:43:00Z
9	2016-11-25-22-44	8007.94489387388	Bitcoin	BTC	2016-11-26T04:44:00Z
10	2016-11-25-22-44	79.9570534513624	Litecoin	LTC	2016-11-26T04:44:00Z

Showing 1 to 10 of 3,042 entries

Previous 1 2 3 4 5 ... 305 Next