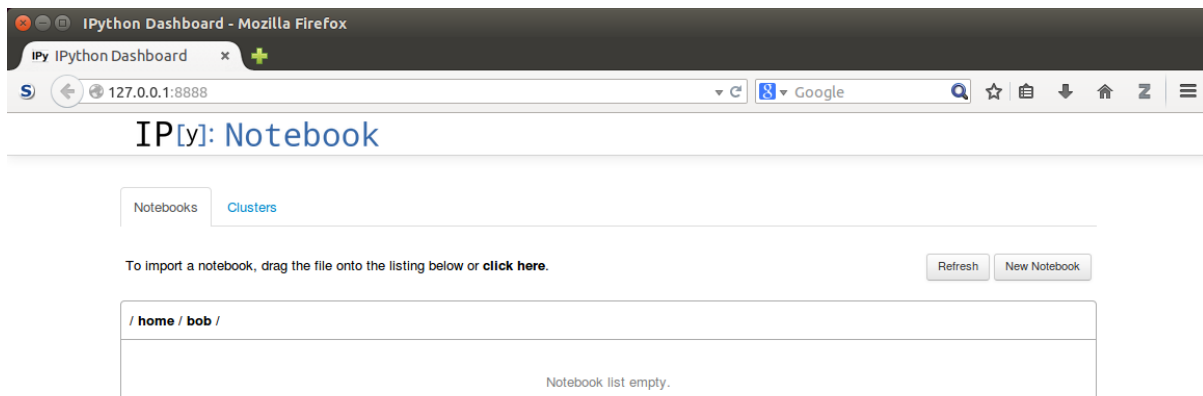


Chapter 1



```
In [1]: import numpy as np
dataset_filename = "affinity_dataset.txt"
X = np.loadtxt(dataset_filename)
```

```
In [2]: print(X[:5])

[[ 0.  0.  1.  1.  1.]
 [ 1.  1.  0.  1.  0.]
 [ 1.  0.  1.  1.  0.]
 [ 0.  0.  1.  1.  1.]
 [ 0.  1.  0.  0.  1.]]
```

```
In [9]: # First, how many rows contain our premise: that a person is buying apples
num_apple_purchases = 0
for sample in X:
    if sample[3] == 1: # This person bought Apples
        num_apple_purchases += 1
print("{} people bought Apples".format(num_apple_purchases))

36 people bought Apples
```

```
In [31]: premise = 1
         conclusion = 3
         print_rule(premise, conclusion, support, confidence, features)
```

Rule: If a person buys milk they will also buy apples
- Confidence: 0.196
- Support: 9

```
In [40]: for index in range(5):
         print("Rule #{0}".format(index + 1))
         (premise, conclusion) = sorted_support[index][0]
         print_rule(premise, conclusion, support, confidence, features)
```

Rule #1

Rule: If a person buys cheese they will also buy bananas
- Confidence: 0.659
- Support: 27

Rule #2

Rule: If a person buys bananas they will also buy cheese
- Confidence: 0.458
- Support: 27

Rule #3

Rule: If a person buys apples they will also buy cheese
- Confidence: 0.694
- Support: 25

Rule #4

Rule: If a person buys cheese they will also buy apples
- Confidence: 0.610
- Support: 25

Rule #5

Rule: If a person buys bananas they will also buy apples
- Confidence: 0.356
- Support: 21

```
In [42]: for index in range(5):
          print("Rule #{0}".format(index + 1))
          (premise, conclusion) = sorted_confidence[index][0]
          print_rule(premise, conclusion, support, confidence, features)
```

Rule #1

Rule: If a person buys apples they will also buy cheese

- Confidence: 0.694
- Support: 25

Rule #2

Rule: If a person buys cheese they will also buy bananas

- Confidence: 0.659
- Support: 27

Rule #3

Rule: If a person buys bread they will also buy bananas

- Confidence: 0.630
- Support: 17

Rule #4

Rule: If a person buys cheese they will also buy apples

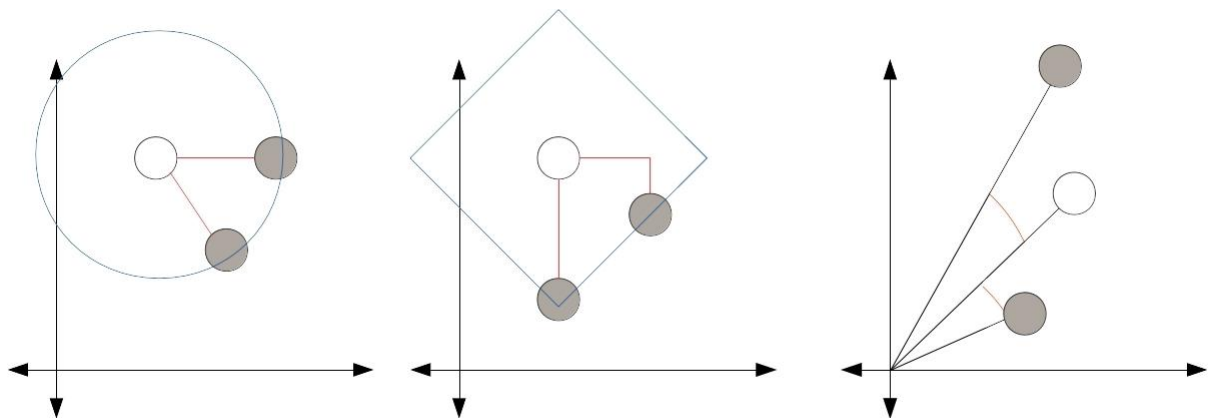
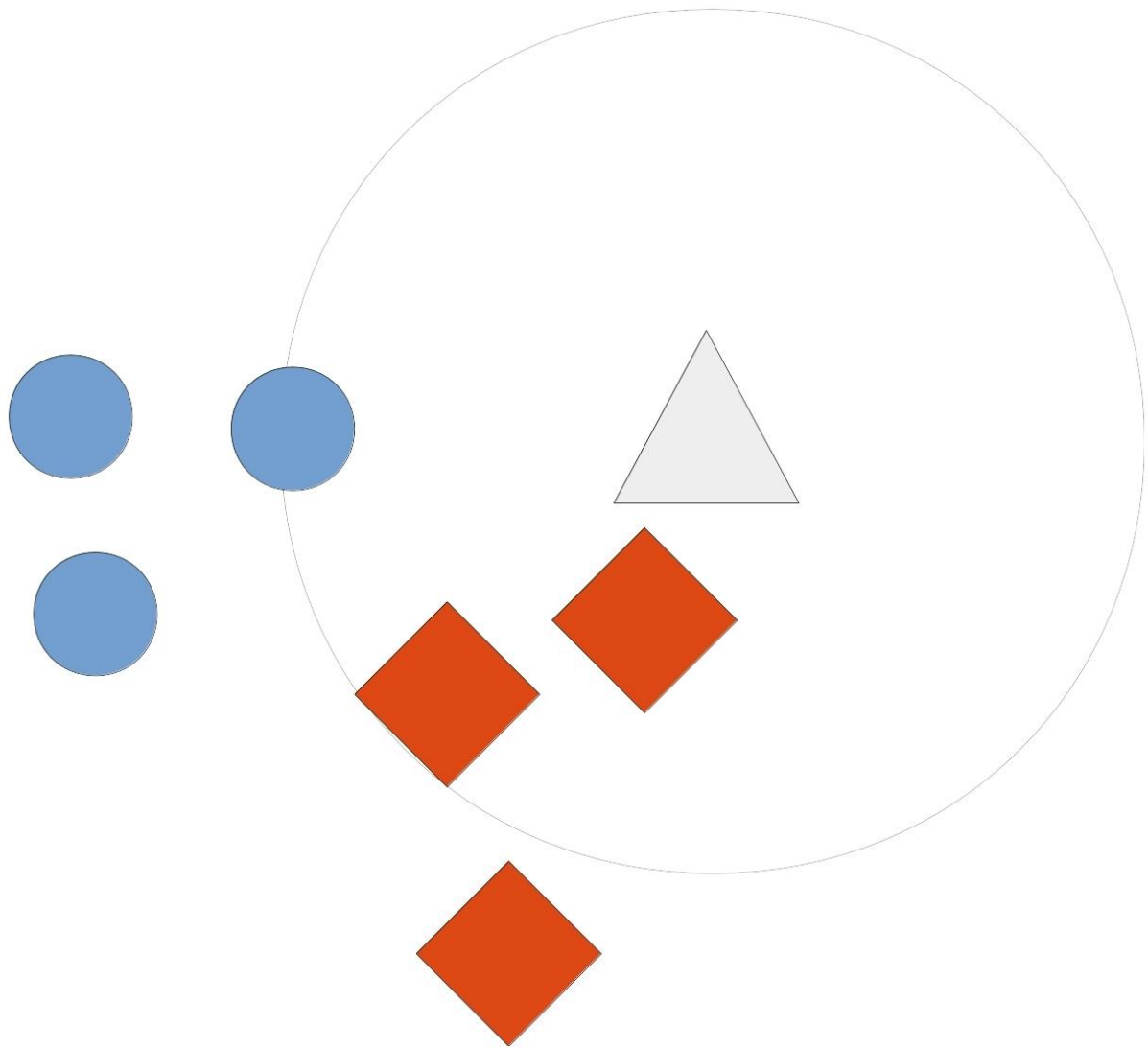
- Confidence: 0.610
- Support: 25

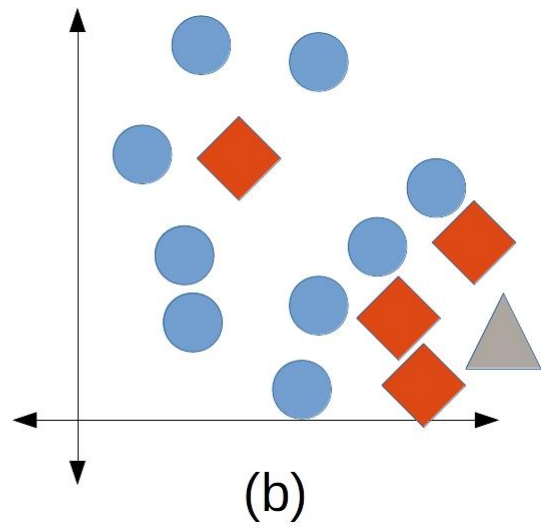
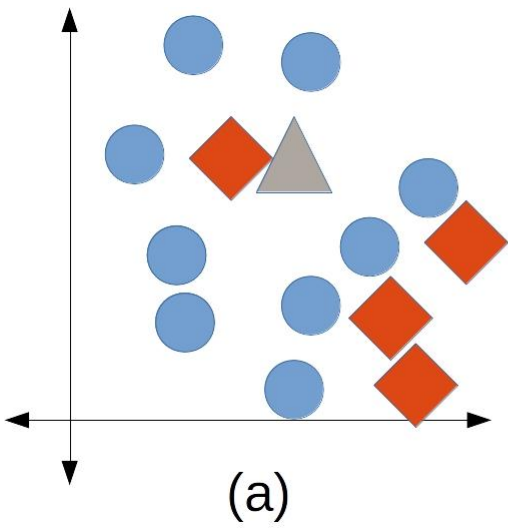
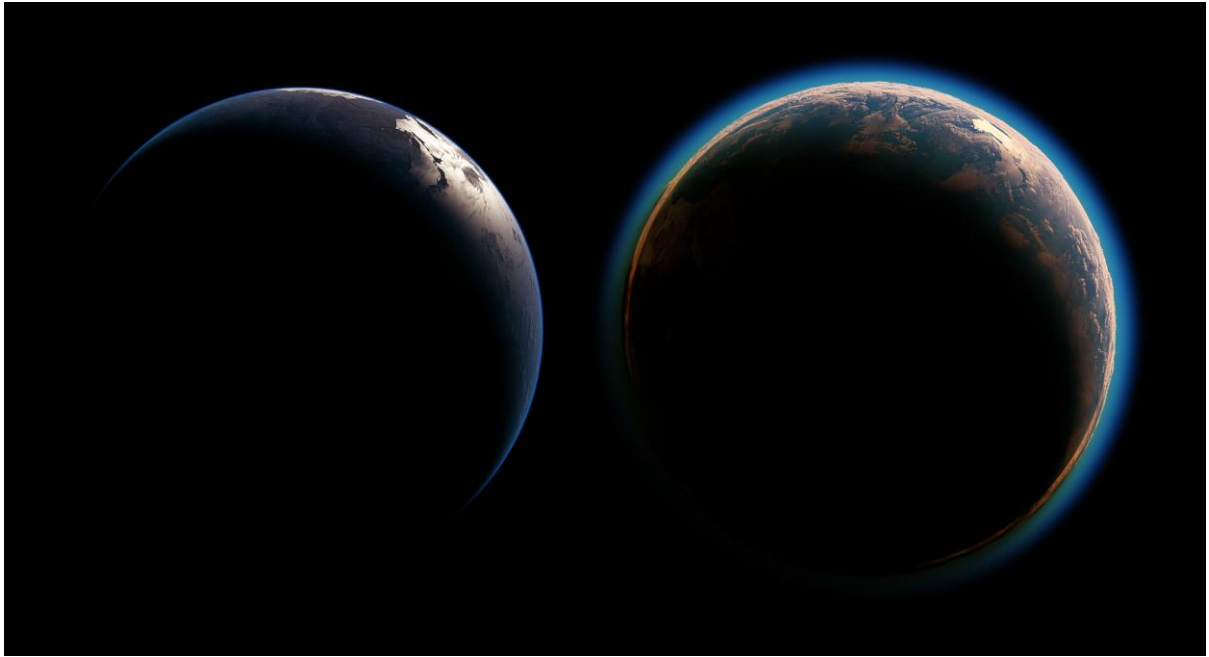
Rule #5

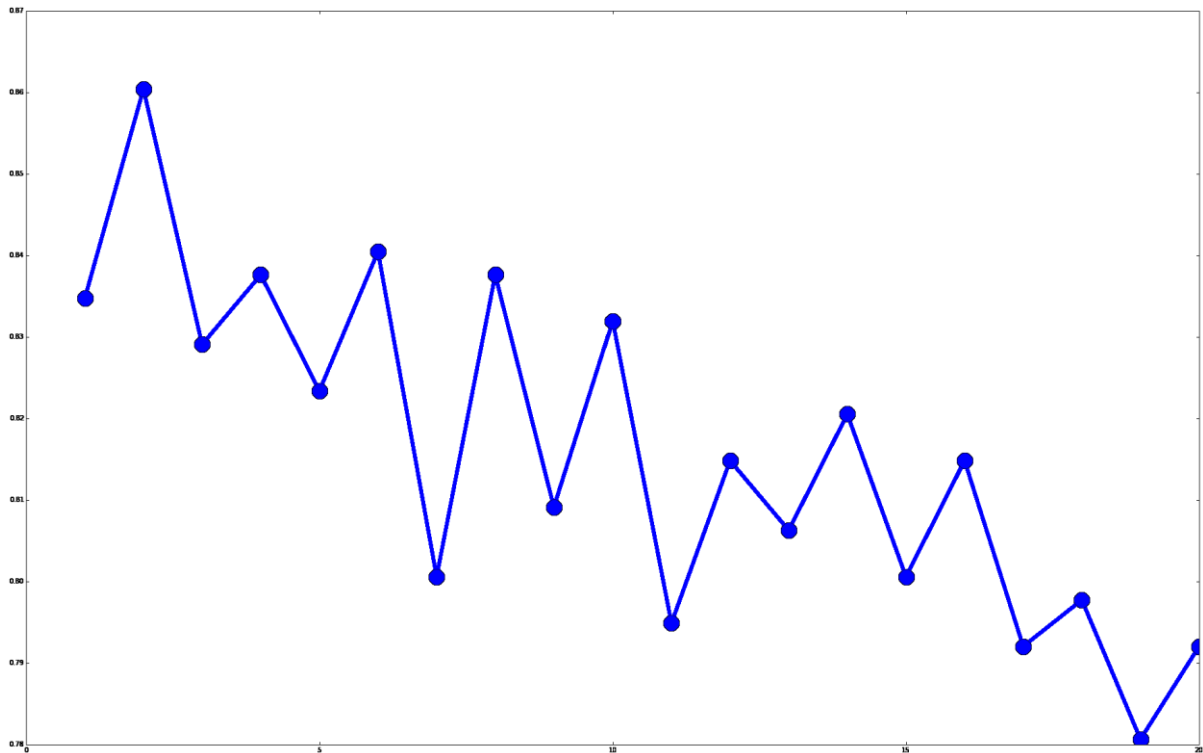
Rule: If a person buys apples they will also buy bananas

- Confidence: 0.583
- Support: 21

Chapter 2







Chapter 3

Out[47]:

Date	NaN	Visitor/Neutral	PTS	Home/Neutral	PTS	NaN	Notes
Tue Oct 29 2013	Box Score	Orlando Magic	87	Indiana Pacers	97	NaN	NaN
		Los Angeles Clippers	103	Los Angeles Lakers	116	NaN	NaN
		Chicago Bulls	95	Miami Heat	107	NaN	NaN
Wed Oct 30 2013	Box Score	Brooklyn Nets	94	Cleveland Cavaliers	98	NaN	NaN

Out[48]:

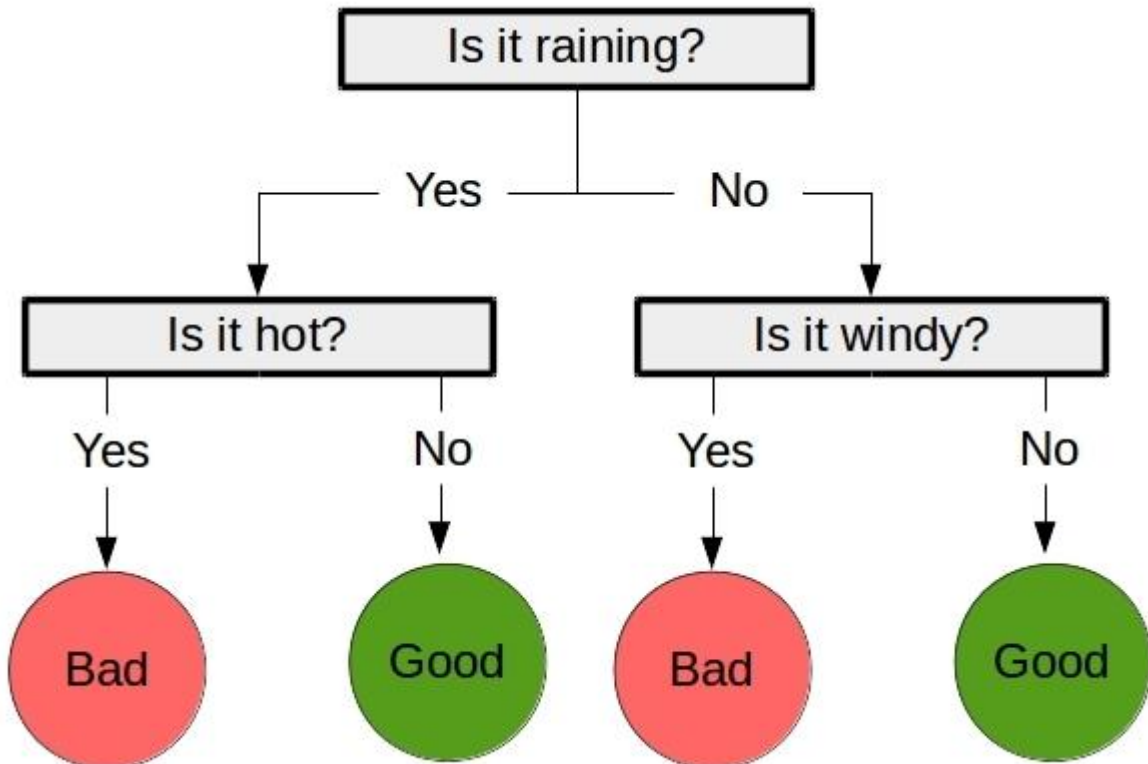
	Date	Score Type	Visitor Team	VisitorPts	Home Team	HomePts	OT?	Notes
0	2013-10-29	Box Score	Orlando Magic	87	Indiana Pacers	97	NaN	NaN
1	2013-10-29	Box Score	Los Angeles Clippers	103	Los Angeles Lakers	116	NaN	NaN
2	2013-10-29	Box Score	Chicago Bulls	95	Miami Heat	107	NaN	NaN
3	2013-10-30	Box Score	Brooklyn Nets	94	Cleveland Cavaliers	98	NaN	NaN
4	2013-10-30	Box Score	Atlanta Hawks	109	Dallas Mavericks	118	NaN	NaN
5	2013-10-30	Box Score	Washington Wizards	102	Detroit Pistons	113	NaN	NaN

Out[52]:

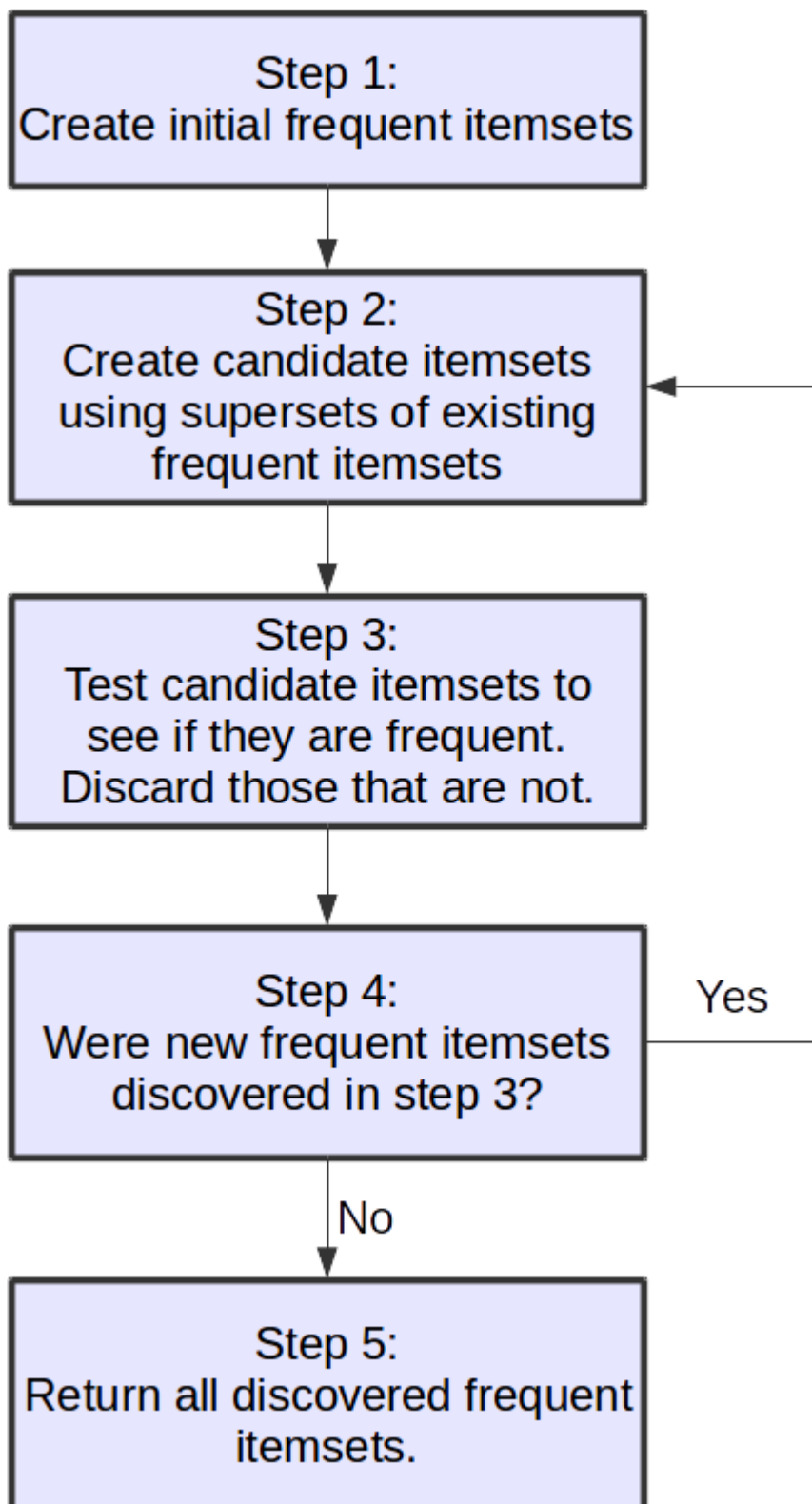
	Date	Score Type	Visitor Team	VisitorPts	Home Team	HomePts	OT?	Notes	HomeWin	HomeLastWin	VisitorLastWin
20	2013-11-01	Box Score	Milwaukee Bucks	105	Boston Celtics	98	NaN	NaN	False	False	False
21	2013-11-01	Box Score	Miami Heat	100	Brooklyn Nets	101	NaN	NaN	True	False	False
22	2013-11-01	Box Score	Cleveland Cavaliers	84	Charlotte Bobcats	90	NaN	NaN	True	False	True
23	2013-11-01	Box Score	Portland Trail Blazers	113	Denver Nuggets	98	NaN	NaN	False	False	False
24	2013-11-01	Box Score	Dallas Mavericks	105	Houston Rockets	113	NaN	NaN	True	True	True
25	2013-11-01	Box Score	San Antonio Spurs	91	Los Angeles Lakers	85	NaN	NaN	False	False	True

Out[57]:

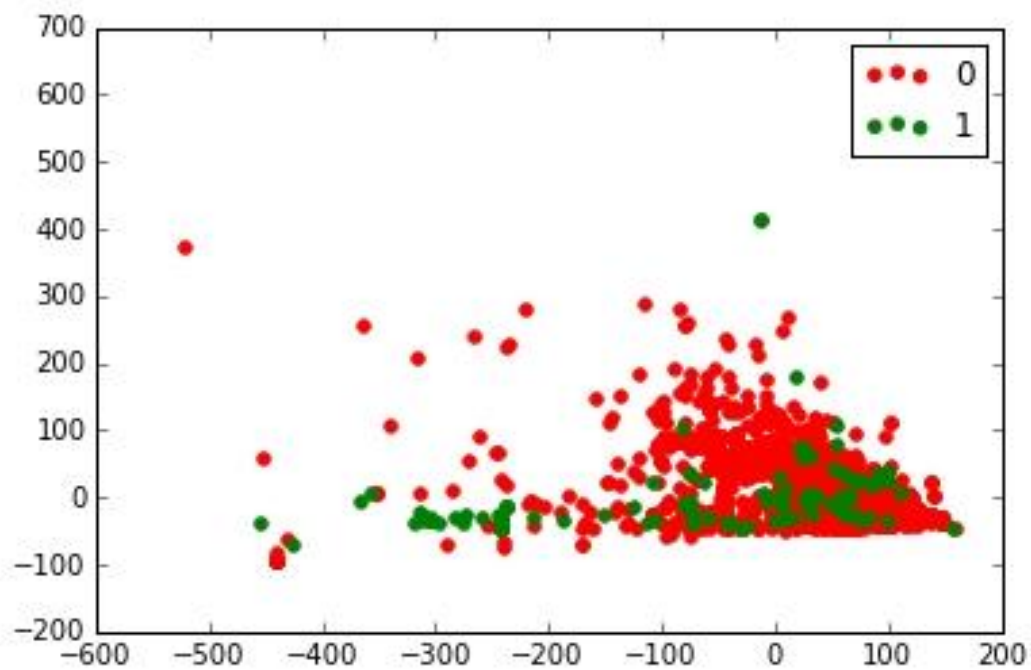
	Rk	Team	Overall	Home	Road	E	W	A	C	SE	...	Post	≤3	≥10	Oct	Nov	Dec	Jan	Feb	Mar	Apr
0	1	Miami Heat	66-16	37-4	29-12	41-11	25-5	14-4	12-6	15-1	...	30-2	9-3	39-8	1-0	10-3	10-5	8-5	12-1	17-1	8-1
1	2	Oklahoma City Thunder	60-22	34-7	26-15	21-9	39-13	7-3	8-2	6-4	...	21-8	3-6	44-6	NaN	13-4	11-2	11-5	7-4	12-5	6-2
2	3	San Antonio Spurs	58-24	35-6	23-18	25-5	33-19	8-2	9-1	8-2	...	16-12	9-5	31-10	1-0	12-4	12-4	12-3	8-3	10-4	3-6
3	4	Denver Nuggets	57-25	38-3	19-22	19-11	38-14	5-5	10-0	4-6	...	24-4	11-7	28-8	0-1	8-8	9-6	12-3	8-4	13-2	7-1
4	5	Los Angeles Clippers	56-26	32-9	24-17	21-9	35-17	7-3	8-2	6-4	...	17-9	3-5	38-12	1-0	8-6	16-0	9-7	8-5	7-7	7-1
5	6	Memphis Grizzlies	56-26	32-9	24-17	22-8	34-18	8-2	8-2	6-4	...	23-8	6-4	28-9	0-1	12-1	7-7	10-7	9-2	11-6	7-2
6	7	New York Knicks	54-28	31-10	23-18	37-15	17-13	10-6	12-6	15-3	...	22-10	7-5	31-12	NaN	11-4	10-5	7-6	6-5	12-6	8-2
7	8	Brooklyn Nets	49-33	26-15	23-18	36-16	13-17	11-5	13-5	12-6	...	18-11	9-4	23-17	NaN	11-4	5-11	11-4	7-5	8-7	7-2
8	9	Indiana Pacers	49-32	30-11	19-21	31-20	18-12	6-11	13-3	12-6	...	17-11	4-9	27-14	1-0	7-8	10-5	9-6	9-3	11-5	2-5
9	10	Golden State Warriors	47-35	28-13	19-22	19-11	28-24	7-3	5-5	7-3	...	17-13	5-3	20-18	1-0	8-6	12-4	8-7	4-8	9-7	5-3



Chapter 4



Chapter 5



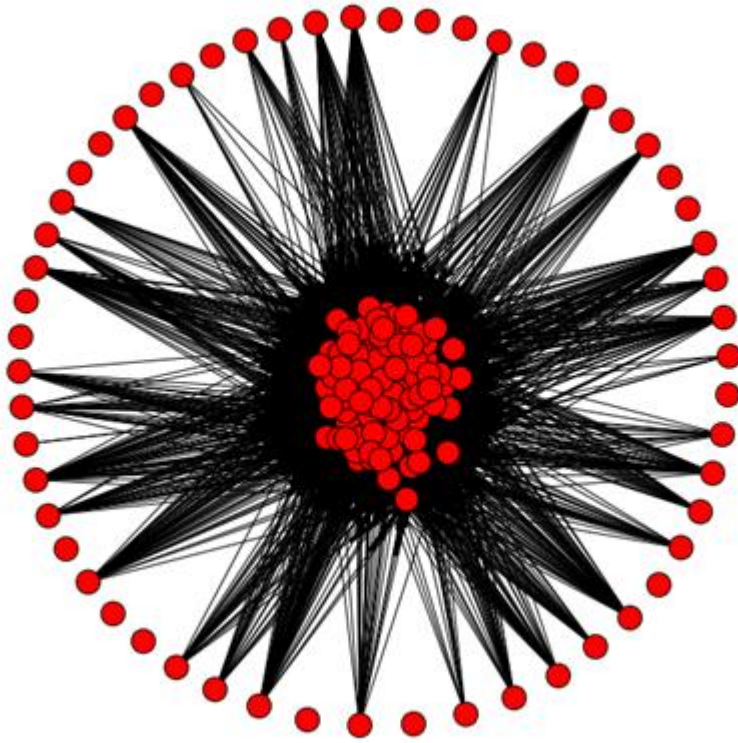
	0	1	2	3	4	5	6	7	8	9	...	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	
0	125	125	1.0000	1	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0	1
1	57	468	8.2105	1	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0	1
2	33	230	6.9696	1	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0	1
3	60	468	7.8000	1	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0	1
4	60	468	7.8000	1	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0	1

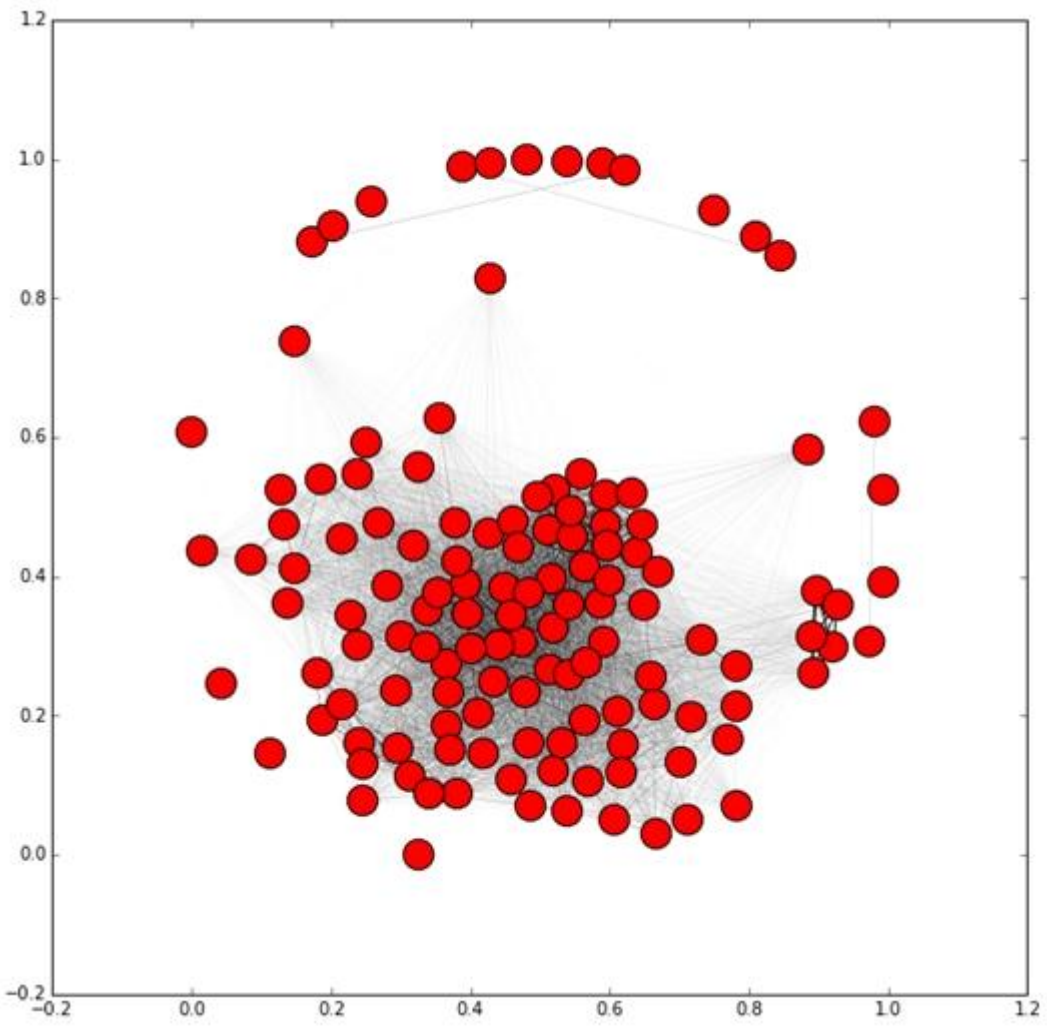
Chapter 6

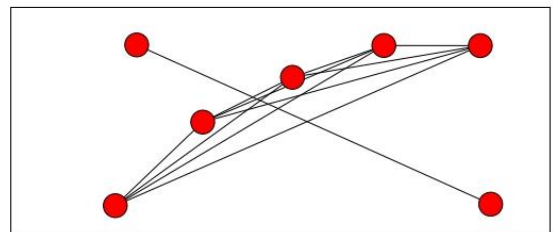
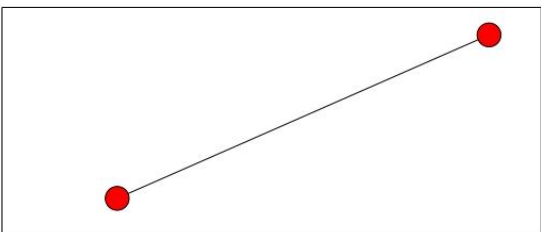
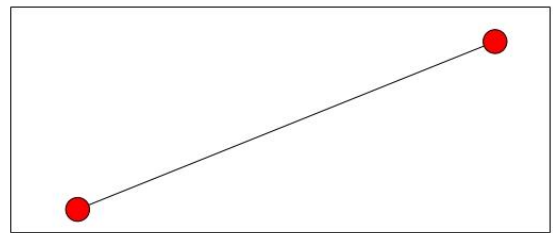
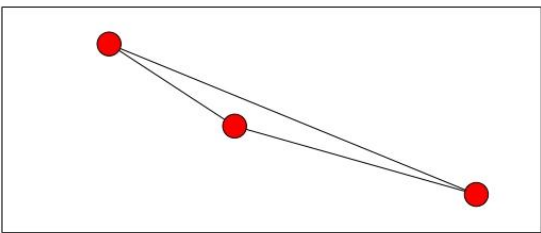
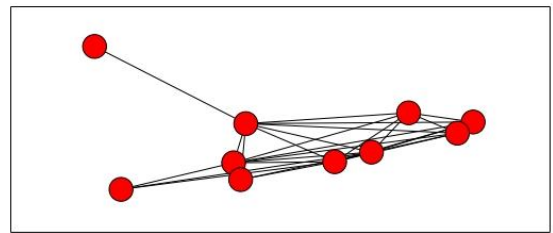
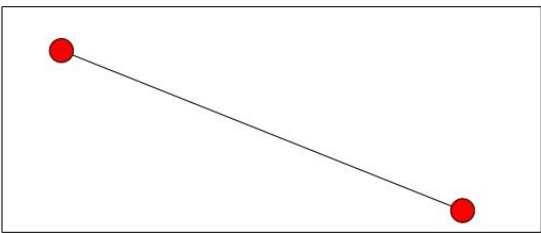
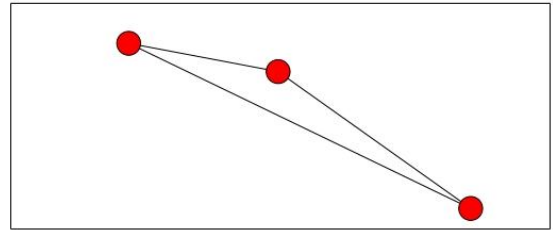
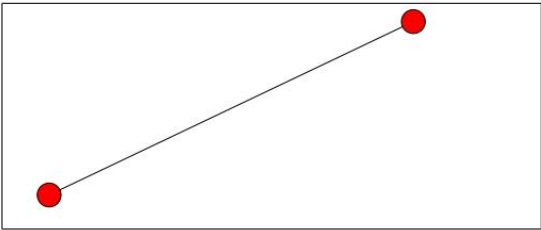
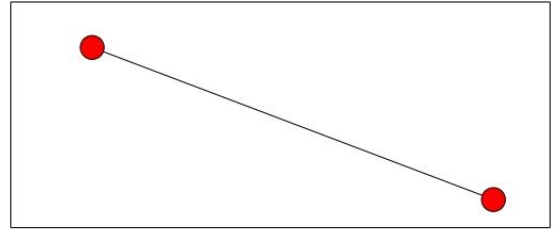
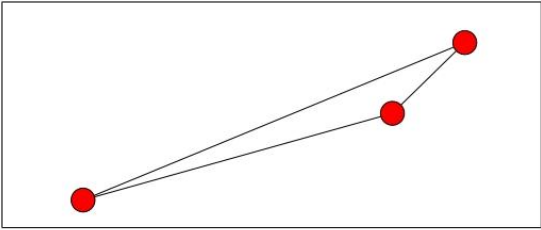
$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

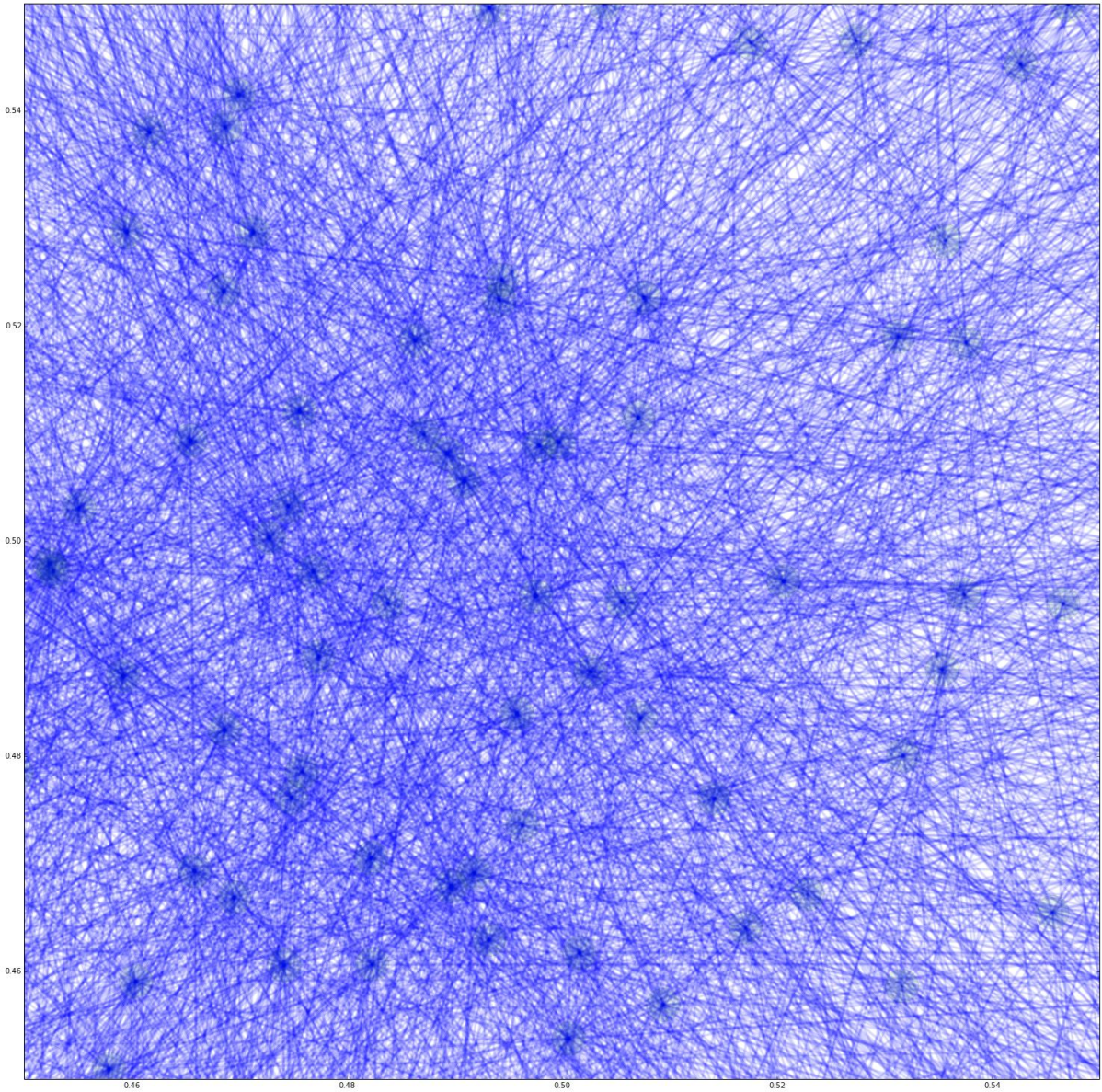
$$F_1 = 2 \cdot \frac{\text{precision} \cdot \text{recall}}{\text{precision} + \text{recall}}$$

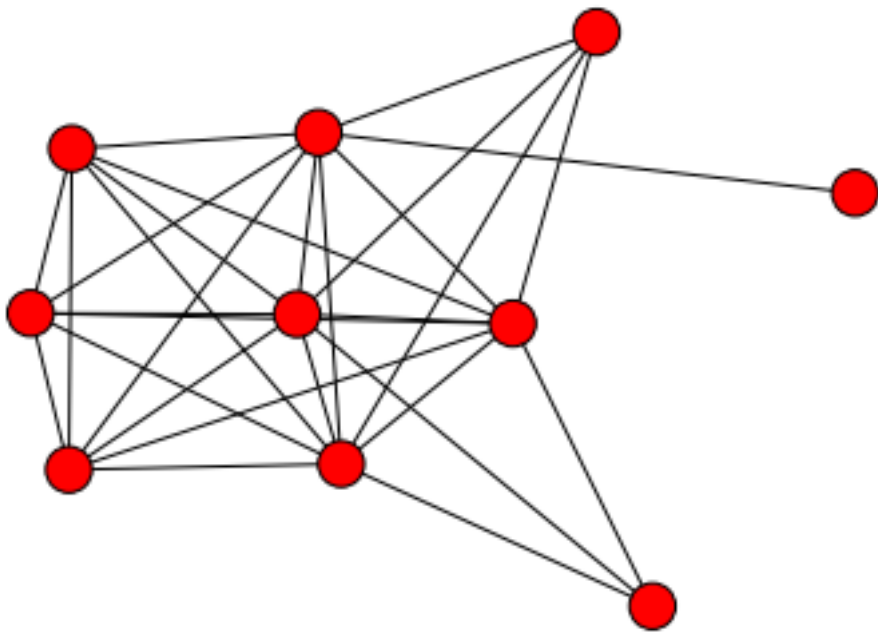
Chapter 7





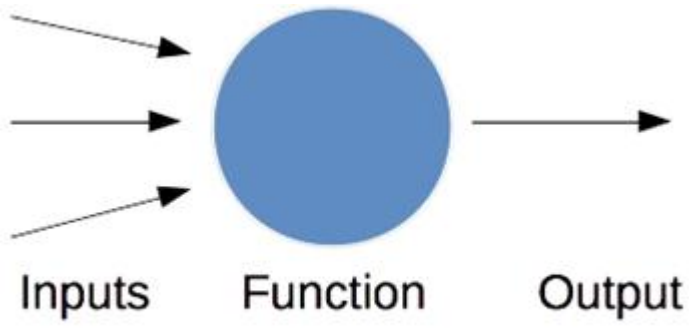




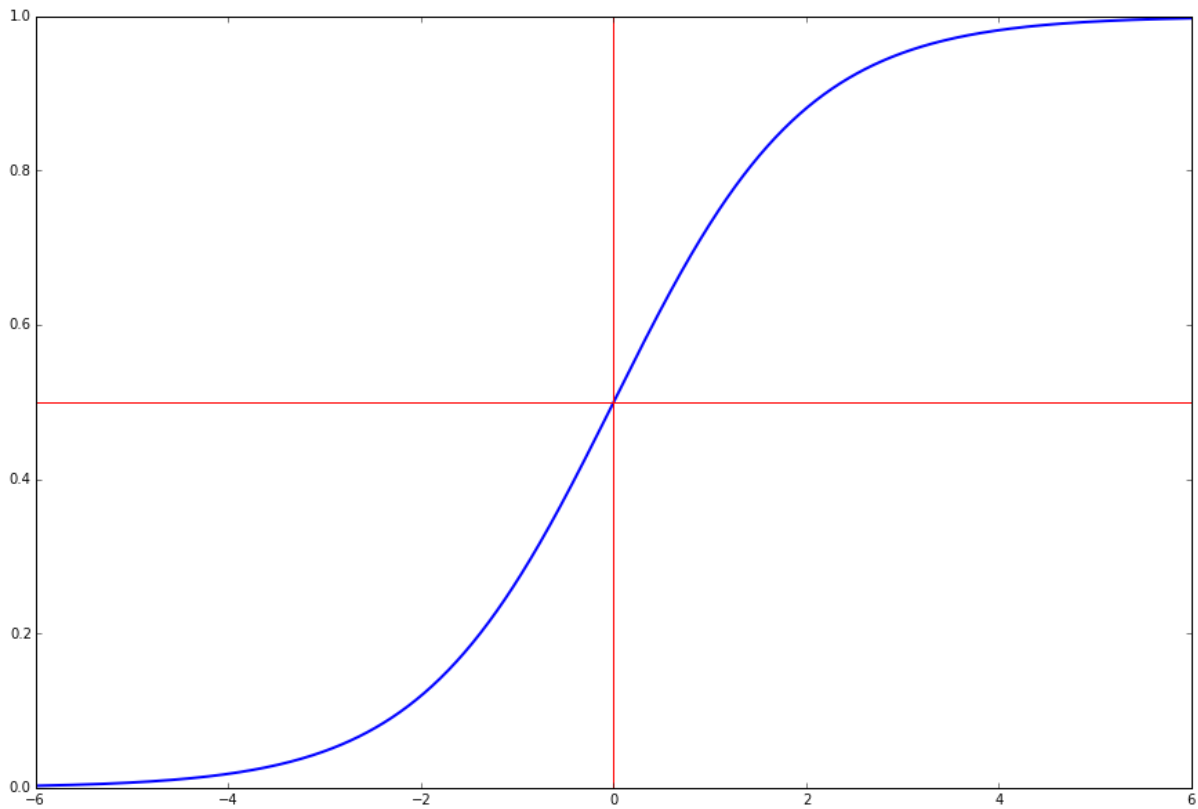


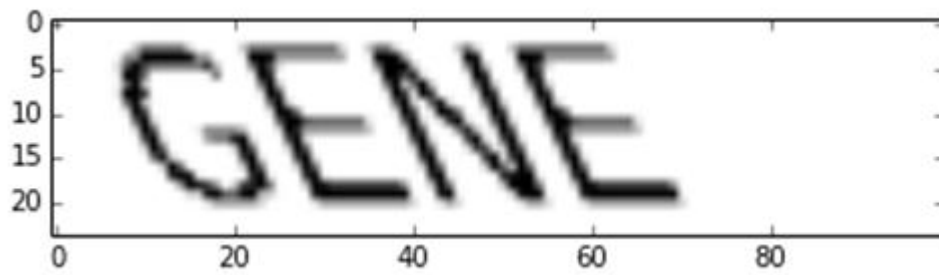
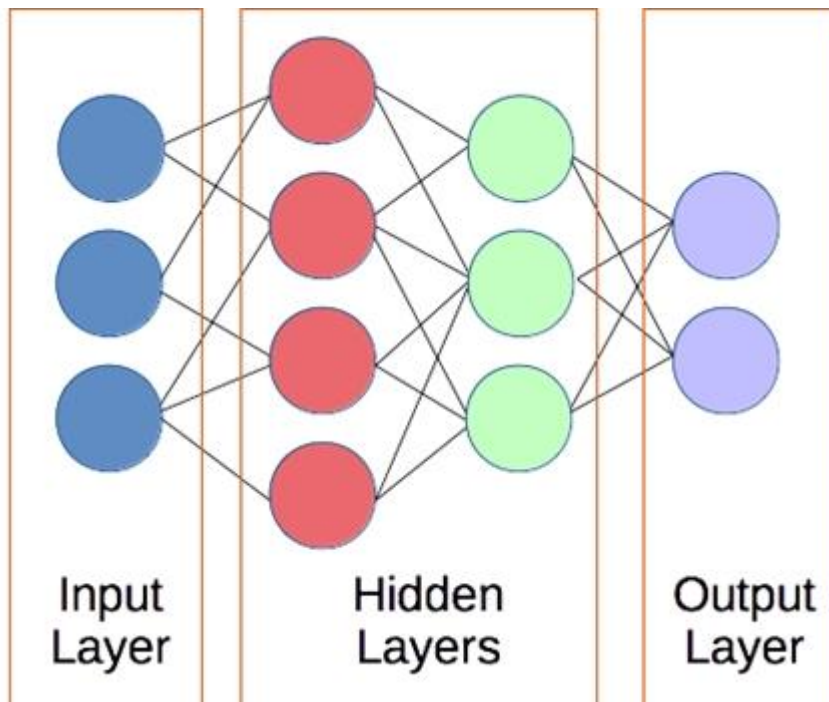
$$s = \frac{b - a}{\max(a, b)}$$

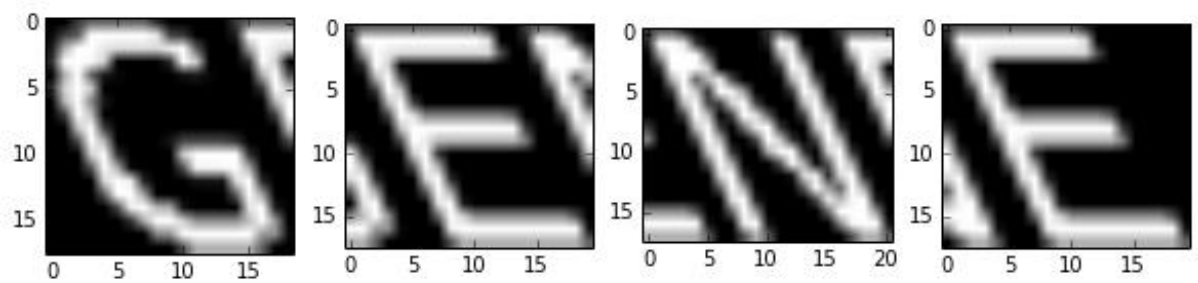
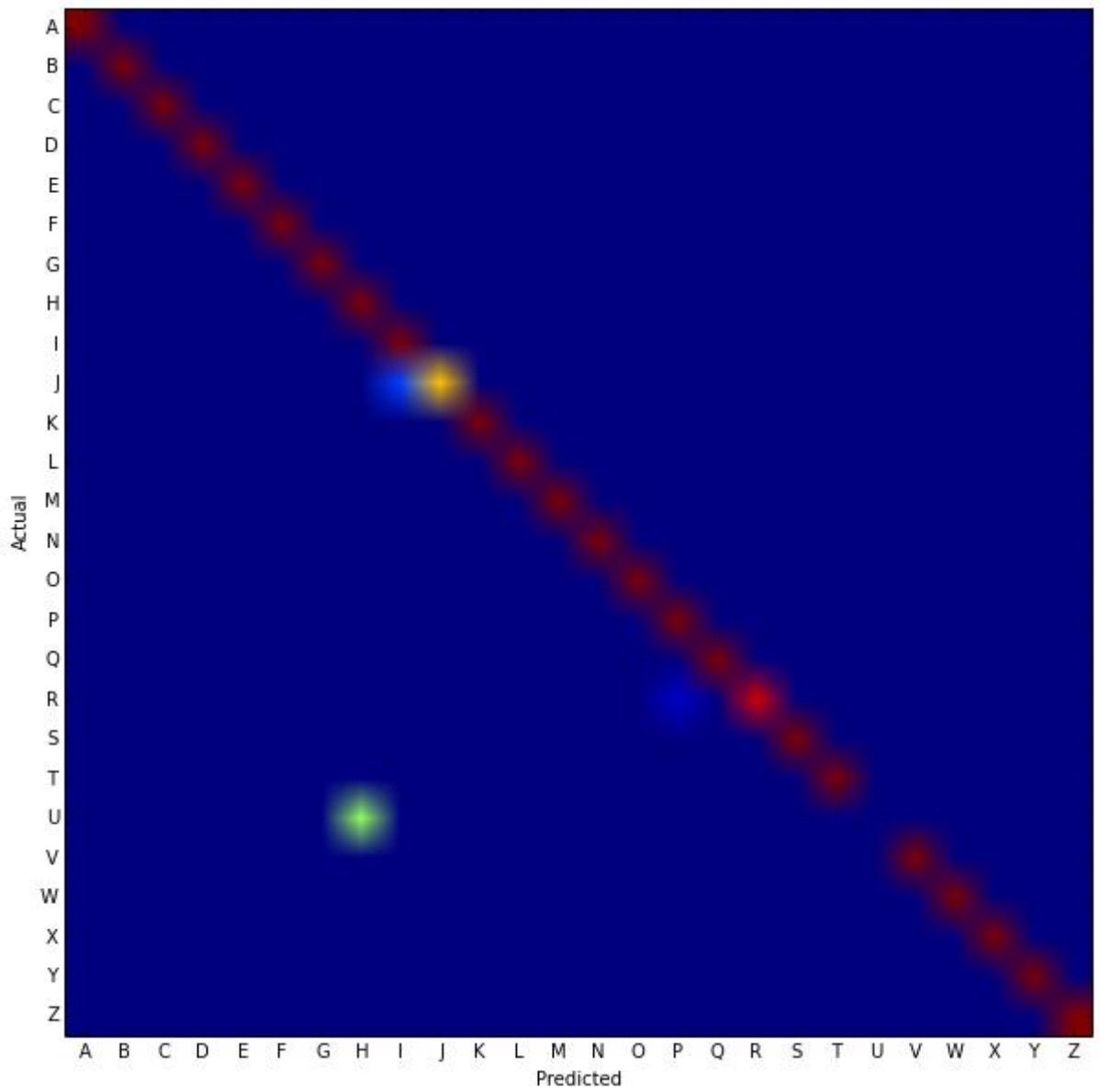
Chapter 8



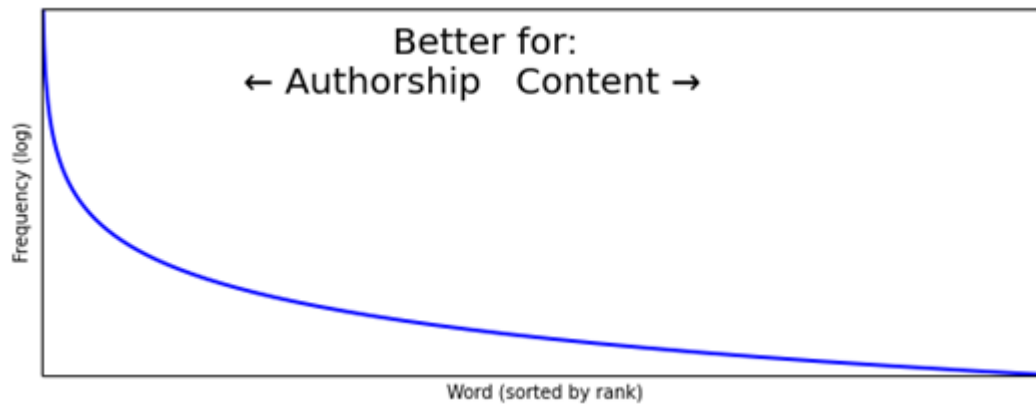
$$f(x) = \frac{L}{1 + e^{-k(x-x_0)}}$$

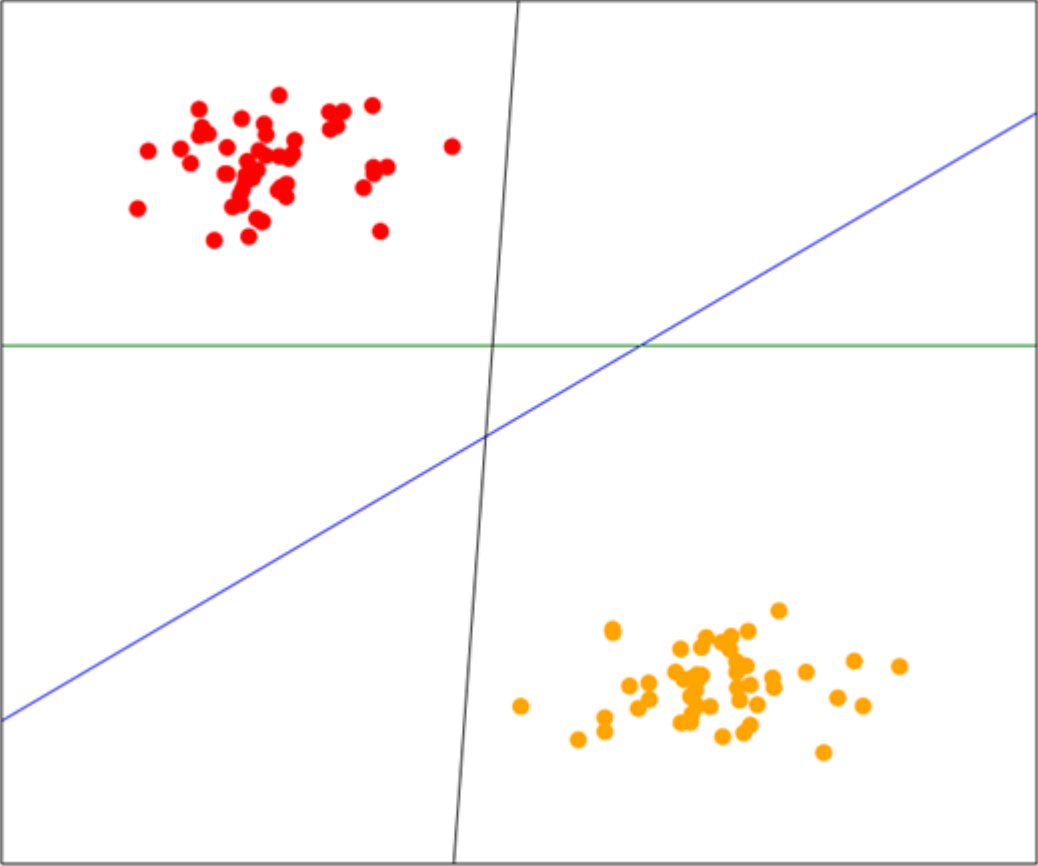




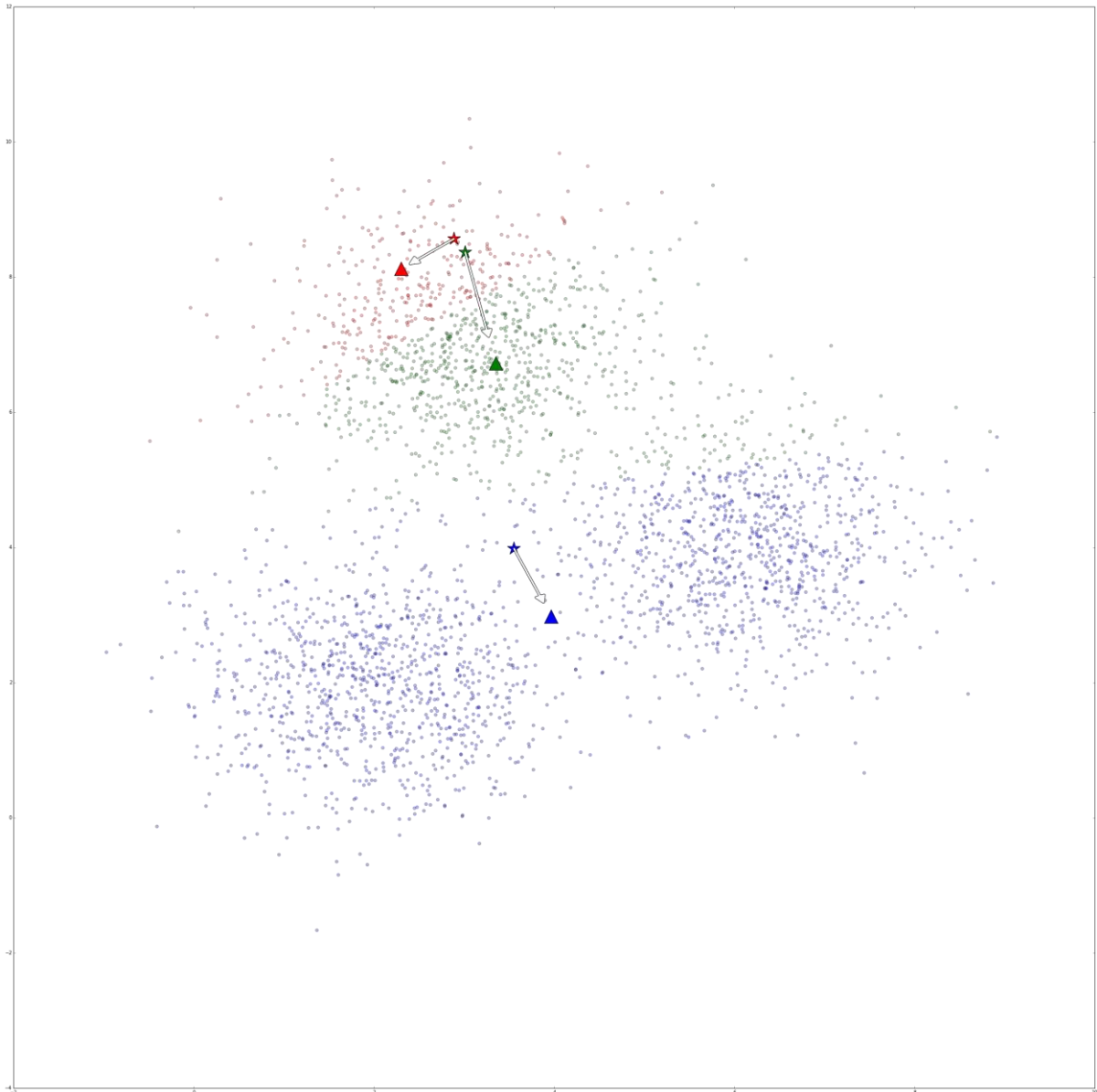


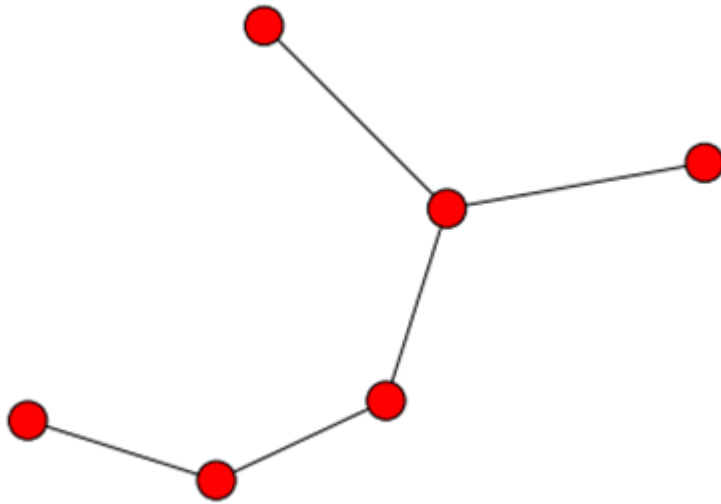
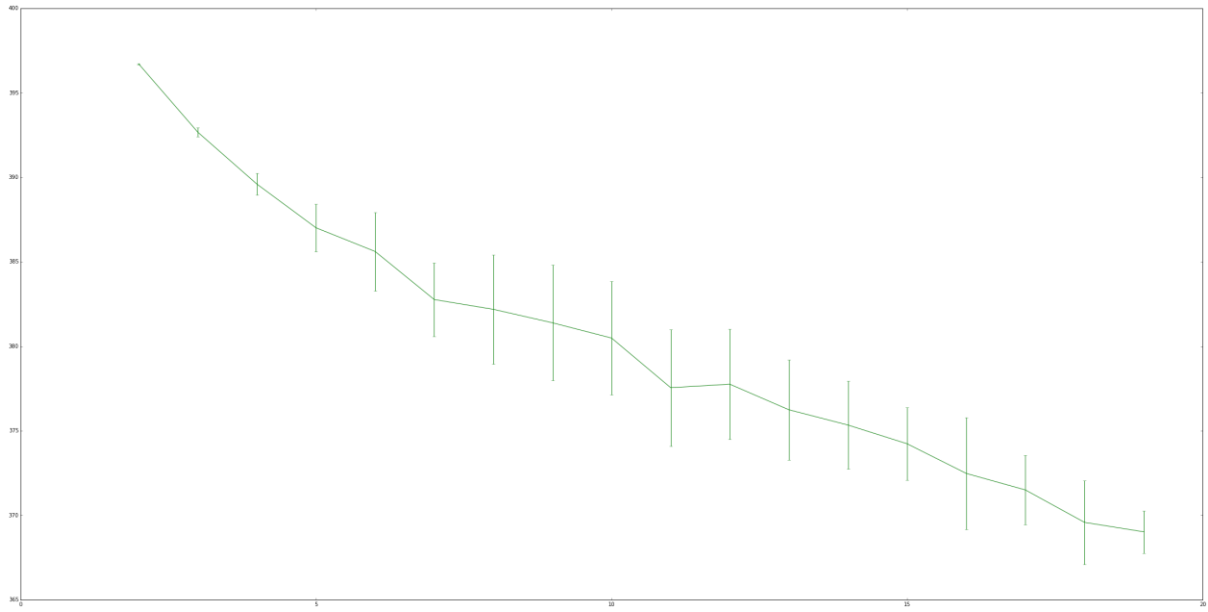
Chapter 9

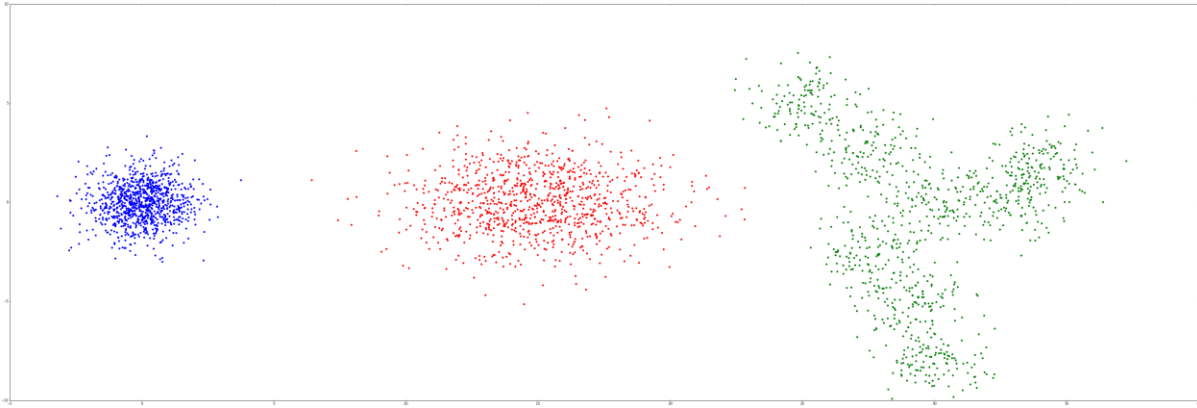




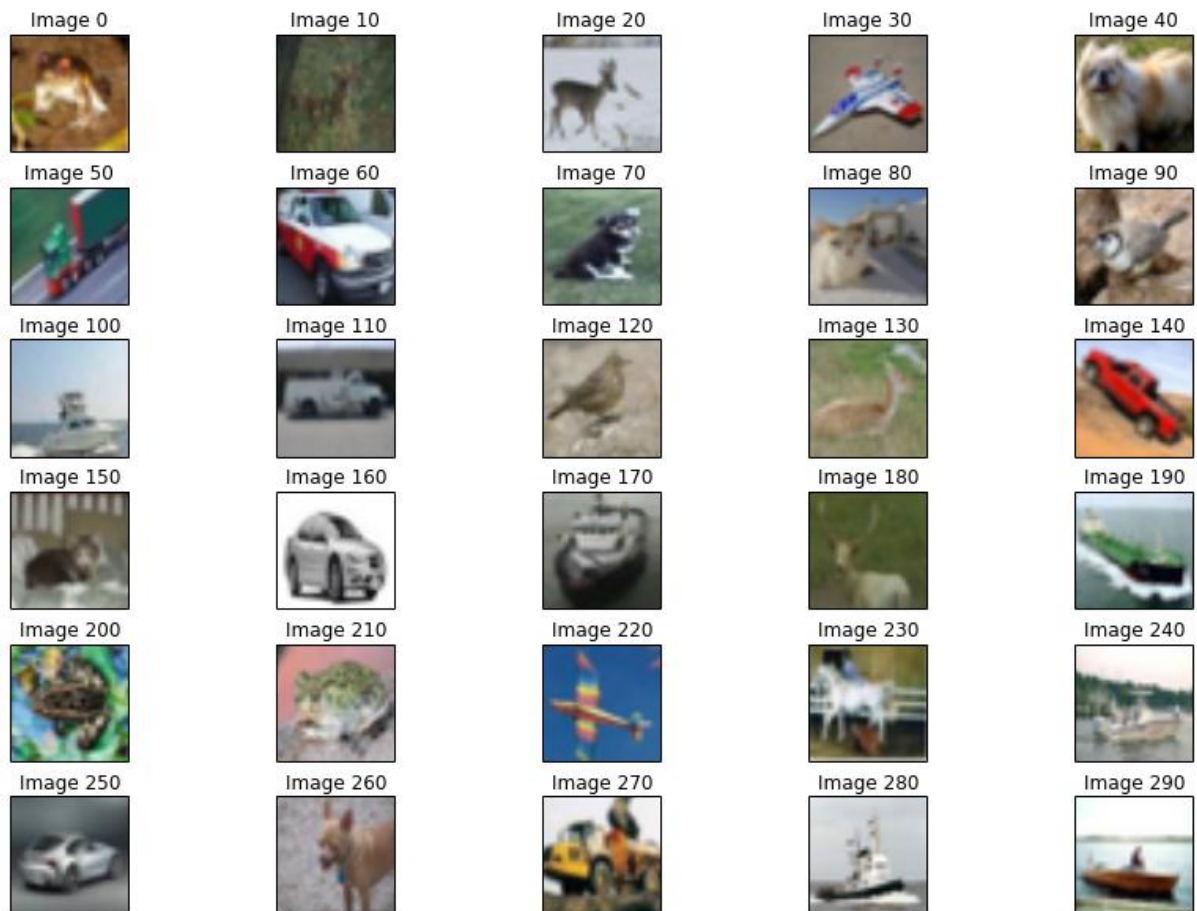
Chapter 10

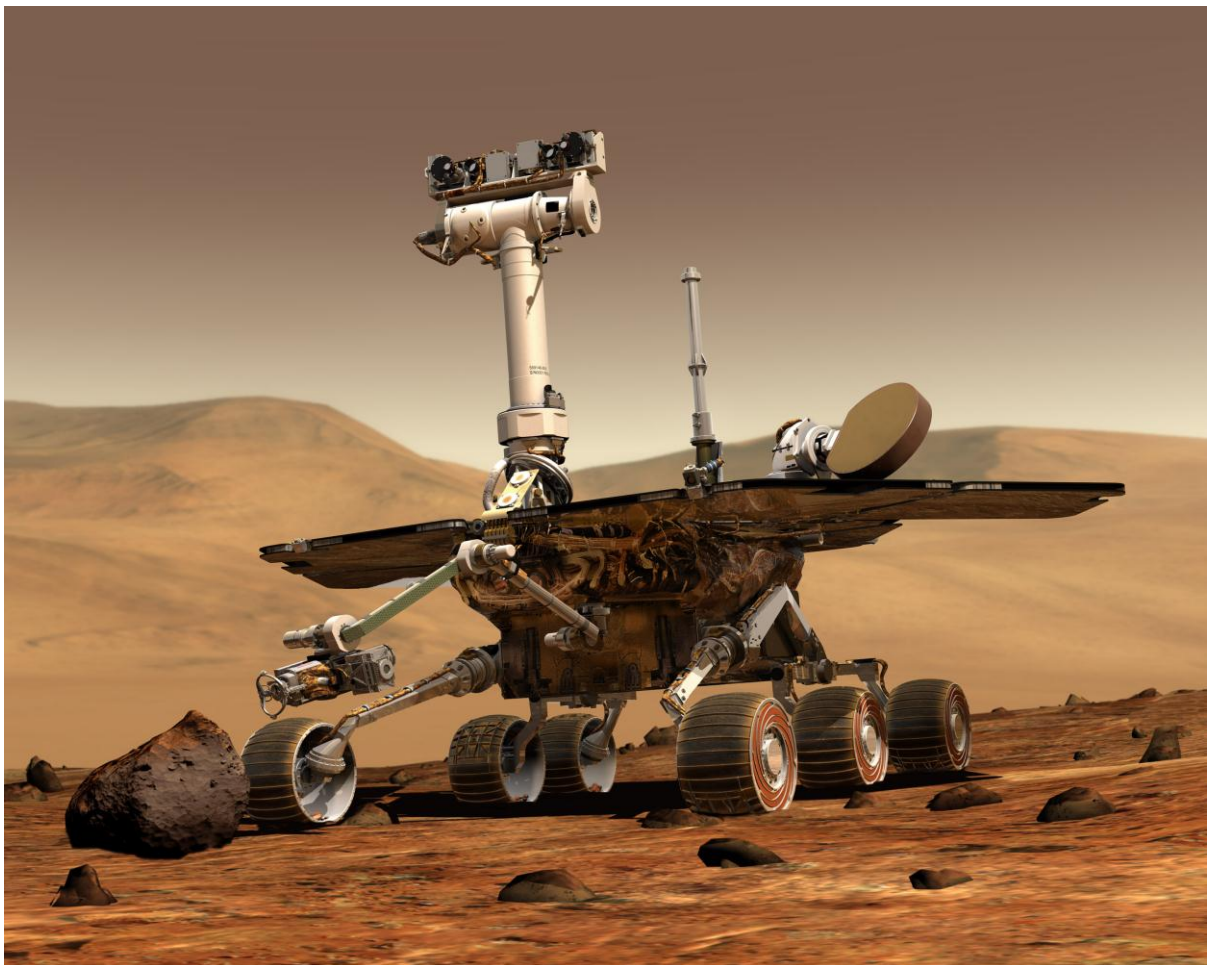
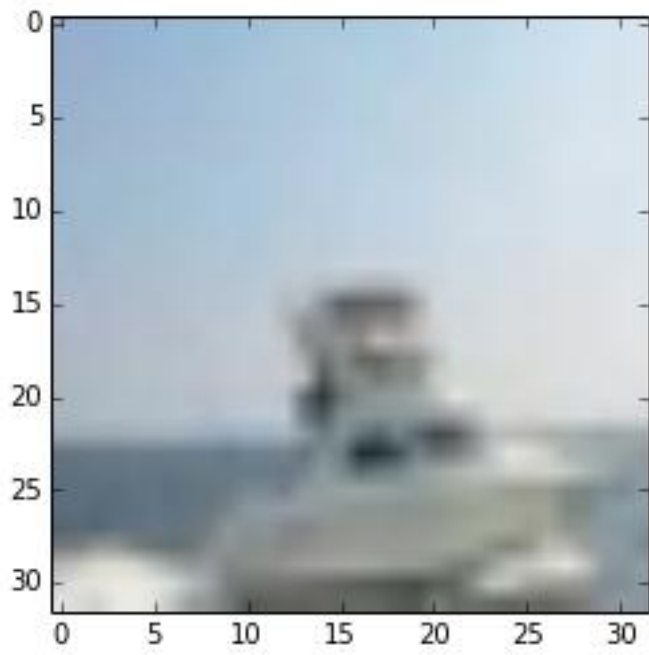






Chapter 11





Chapter 12

