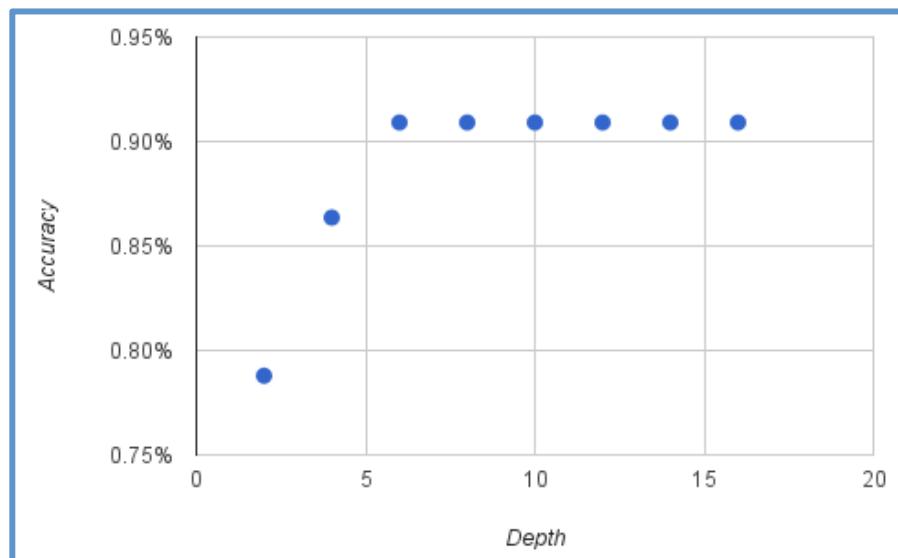


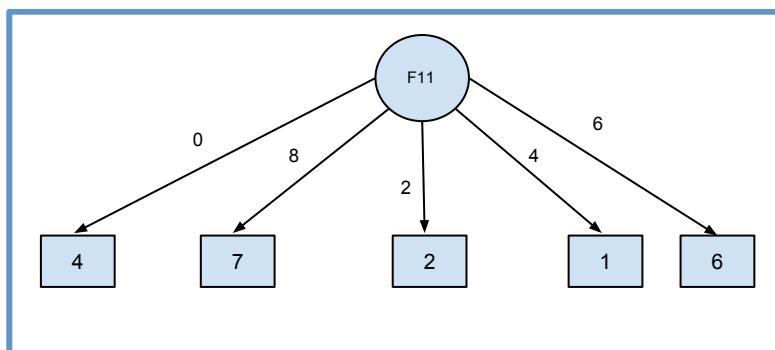
Part 1:

Depth vs. Accuracy for different depths (2, 4, 6 .. ,16):

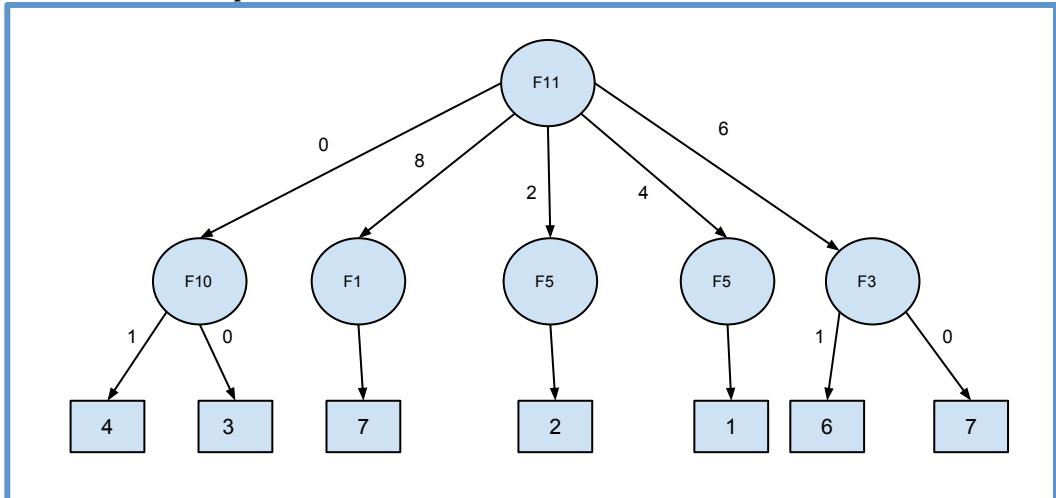


Part 2 (Zoo dataset):

Decision Tree depth 1:



Decision Tree depth 2:



Confusion matrix (depth 1):

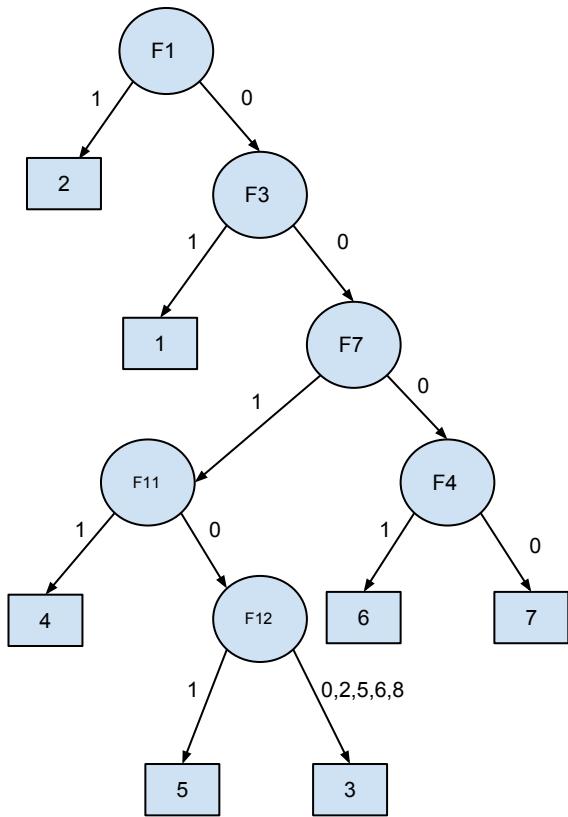
Predicted							Observed
1	2	3	4	5	6	7	
8	4	0	2	0	0	0	1
0	7	0	0	0	0	0	2
2	0	0	0	0	0	0	3
0	0	0	4	0	0	0	4
1	0	0	0	0	0	0	5
0	0	0	0	0	3	0	6
1	0	0	3	0	0	0	7

Confusion matrix (depth 2):

Predicted							Observed
1	2	3	4	5	6	7	
8	4	0	2	0	0	0	1
0	7	0	0	0	0	0	2
2	0	0	0	0	0	0	3
0	0	0	4	0	0	0	4
1	0	0	0	0	0	0	5
0	0	0	0	0	2	1	6
1	0	3	0	0	0	0	7

Part 3: (Weka)

Decision Tree:



Confusion matrix:

Predicted							Observed
1	2	3	4	5	6	7	
14	0	0	0	0	0	0	1
0	7	0	0	0	0	0	2
0	0	0	0	1	0	1	3
0	0	0	4	0	0	0	4
0	0	0	0	1	0	0	5
0	0	0	0	0	2	1	6
0	0	0	0	0	0	4	7

Part 4: (Our dataset)

The size of the training dataset: 1080

The size of the test dataset: 504

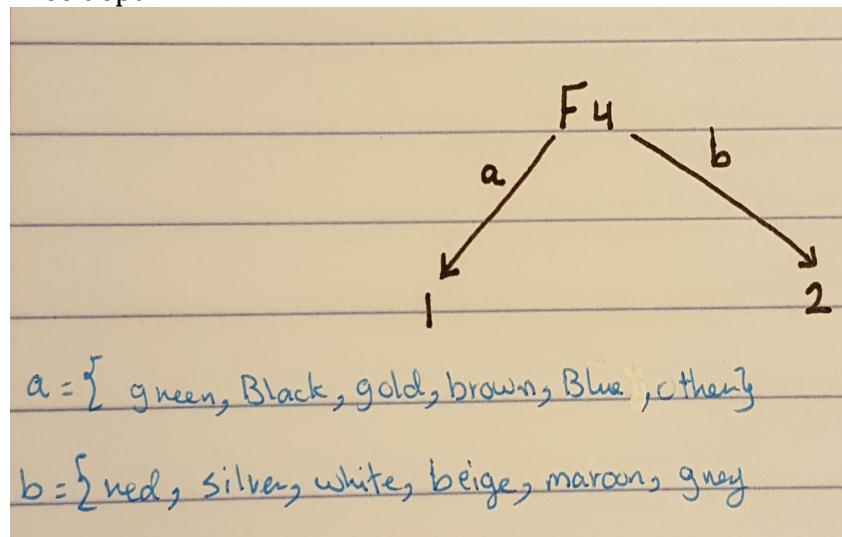
Initially the label values are: 0= good buy, 1= bad buy, however, in order to generalize our code we changed the labels as follows: 1= good buy, 2= bad buy.

Features in our dataset:

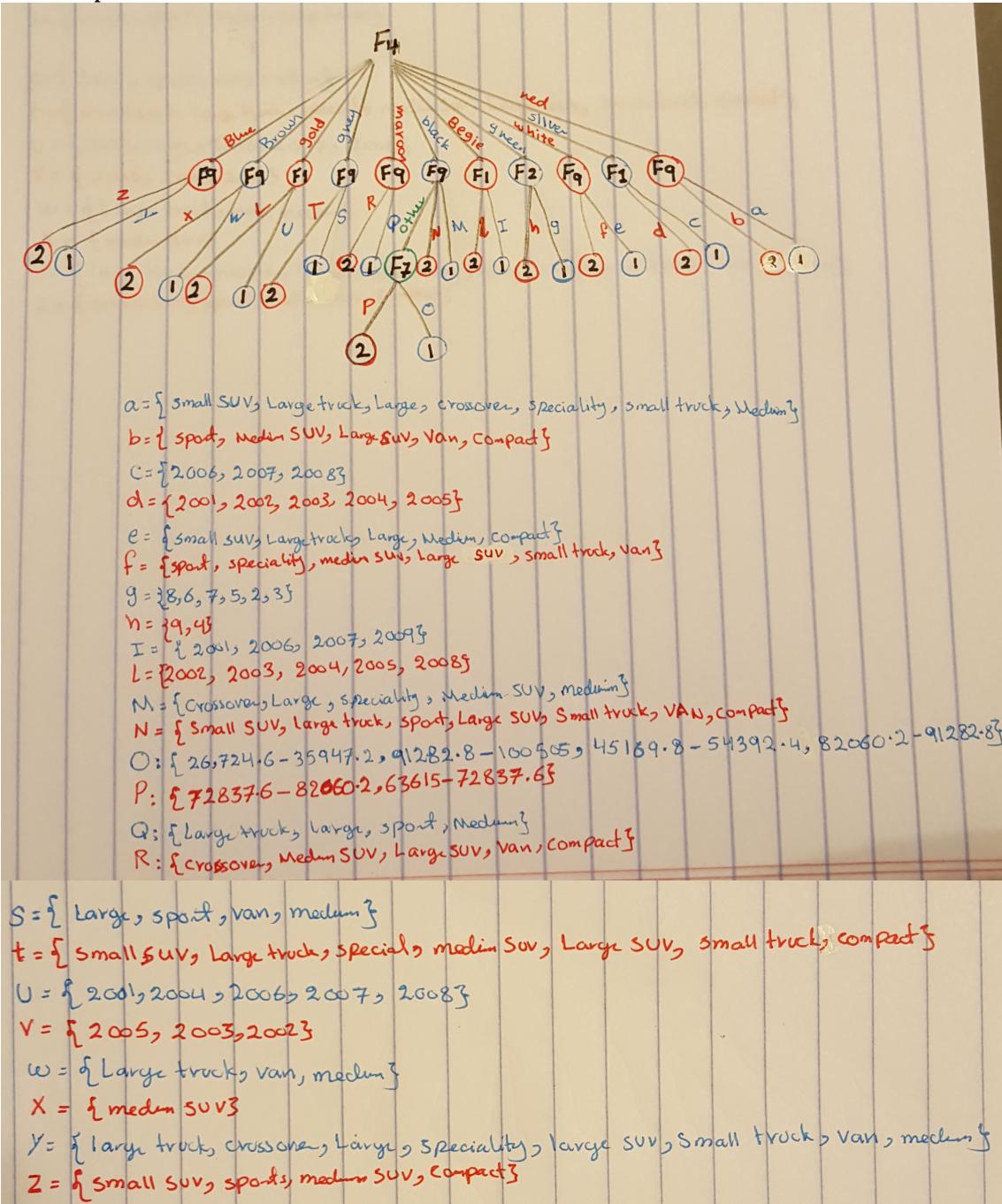
Index	Features
F0	Auction
F1	VehYear
F2	VehicleAge
F3	Make
F4	Color
F5	Transmission
F6	WheelType
F7	VehOdo
F8	Nationality
F9	Size
F10	MMRCurrentRetailAveragePrice
F11	WarrantyCost
F12	IsBadBuy (Class)

A) Using our code:

Tree depth 1:



Tree depth 2:



Confusion matrix (depth 1):

Predicted		
1	2	Observed
99	152	1
96	157	2

Accuracy: 77.04%

Confusion matrix (depth 2):

Predicted		Observed
1	2	
151	100	1
139	114	2

Accuracy: 77.87%

B) Using Weka

Decision Tree:

Since the tree is complex, it is placed in the appendix

Confusion matrix:

Predicted		Observed
1	2	
159	92	1
113	140	2

Accuracy: 59.32%

Appendix

```
VehYear <= 2005
| VehicleAge <= 5
| | Size = COMPACT: 1 (55.0/21.0)
| | Size = MEDIUM SUV
| | | VehicleAge <= 4: 1 (23.0/5.0)
| | | VehicleAge > 4
| | | | Nationality = AMERICAN: 1 (41.0/18.0)
| | | | Nationality = TOP LINE ASIAN: 0 (3.0)
| | | | Nationality = OTHER ASIAN
| | | | | Make = DODGE: 0 (0.0)
| | | | | Make = FORD: 0 (0.0)
| | | | | Make = CHEVROLET: 0 (0.0)
| | | | | Make = NISSAN: 0 (0.0)
| | | | | Make = KIA: 0 (2.0)
| | | | | Make = TOYOTA: 0 (0.0)
| | | | | Make = HYUNDAI: 1 (2.0)
| | | | | Make = HONDA: 0 (0.0)
| | | | | Make = GMC: 0 (0.0)
| | | | | Make = MINI: 0 (0.0)
| | | | | Make = VOLKSWAGEN: 0 (0.0)
| | | | Nationality = OTHER: 1 (0.0)
| | | Size = LARGE: 1 (25.0/12.0)
| | | Size = SMALL TRUCK
| | | | VehicleAge <= 4: 0 (2.0)
| | | | VehicleAge > 4: 1 (3.0/1.0)
| | | Size = VAN
| | | | VehOdo = '(-inf-26724.6]': 1 (0.0)
| | | | VehOdo = '(26724.6-35947.2]': 1 (0.0)
| | | | VehOdo = '(35947.2-45169.8]': 0 (1.0)
| | | | VehOdo = '(45169.8-54392.4]': 1 (1.0)
| | | | VehOdo = '(54392.4-63615]': 0 (3.0)
| | | | VehOdo = '(63615-72837.6]': 1 (17.0/5.0)
| | | | VehOdo = '(72837.6-82060.2]'
| | | | | Auction = MANHEIM: 1 (7.0/2.0)
| | | | | Auction = OTHER: 0 (3.0)
| | | | | Auction = ADESA: 0 (0.0)
| | | | | VehOdo = '(82060.2-91282.8]': 1 (3.0/1.0)
| | | | | VehOdo = '(91282.8-100505.4]': 1 (4.0)
| | | | | VehOdo = '(100505.4-inf)': 1 (0.0)
| | | Size = LARGE SUV
| | | | VehYear <= 2004: 0 (5.0/2.0)
| | | | VehYear > 2004: 1 (5.0)
| | | Size = LARGE TRUCK: 0 (24.0/10.0)
| | | Size = MEDIUM
```

```
| | | Color = RED: 1 (3.0/1.0)
| | | Color = GREY
| | | | VehYear <= 2004: 1 (3.0)
| | | | VehYear > 2004: 0 (14.0/4.0)
| | | Color = SILVER
| | | | VehOdo = '(-inf-26724.6]': 1 (0.0)
| | | | VehOdo = '(26724.6-35947.2]': 1 (0.0)
| | | | VehOdo = '(35947.2-45169.8]': 1 (0.0)
| | | | VehOdo = '(45169.8-54392.4]': 1 (0.0)
| | | | VehOdo = '(54392.4-63615]': 1 (3.0/1.0)
| | | | VehOdo = '(63615-72837.6]': 1 (3.0)
| | | | VehOdo = '(72837.6-82060.2]': 0 (10.0/3.0)
| | | | VehOdo = '(82060.2-91282.8]'
| | | | | MMRCurrentRetailAveragePrice = '(-inf-5921.3]': 1 (3.0)
| | | | | MMRCurrentRetailAveragePrice = '(5921.3-9605.6]': 0 (2.0)
| | | | | MMRCurrentRetailAveragePrice = '(9605.6-13289.9]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(13289.9-16974.2]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(16974.2-20658.5]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(20658.5-24342.8]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(24342.8-28027.1]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(28027.1-31711.4]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(31711.4-35395.7]': 1 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(35395.7-inf)': 1 (0.0)
| | | | VehOdo = '(91282.8-100505.4]'
| | | | | VehicleAge <= 4: 1 (2.0)
| | | | | VehicleAge > 4: 0 (3.0/1.0)
| | | | | VehOdo = '(100505.4-inf)': 1 (0.0)
| | | | Color = BLACK: 1 (3.0/1.0)
| | | | Color = BLUE: 0 (12.0/3.0)
| | | | Color = WHITE: 0 (16.0/2.0)
| | | | Color = OTHER: 0 (1.0)
| | | | Color = GREEN
| | | | | MMRCurrentRetailAveragePrice = '(-inf-5921.3]': 0 (2.0)
| | | | | MMRCurrentRetailAveragePrice = '(5921.3-9605.6]'
| | | | | | WheelType = Special: 0 (0.0)
| | | | | | WheelType = Alloy: 1 (2.0)
| | | | | | WheelType = Covers: 0 (4.0/1.0)
| | | | | MMRCurrentRetailAveragePrice = '(9605.6-13289.9]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(13289.9-16974.2]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(16974.2-20658.5]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(20658.5-24342.8]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(24342.8-28027.1]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(28027.1-31711.4]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(31711.4-35395.7]': 0 (0.0)
| | | | | MMRCurrentRetailAveragePrice = '(35395.7-inf)': 0 (0.0)
| | | | Color = BEIGE: 1 (2.0)
```

```
| | | Color = MAROON
| | | | WheelType = Special: 0 (0.0)
| | | | WheelType = Alloy: 0 (4.0/1.0)
| | | | WheelType = Covers: 1 (3.0/1.0)
| | | Color = GOLD
| | | | Auction = MANHEIM: 1 (6.0/1.0)
| | | | Auction = OTHER: 1 (4.0/1.0)
| | | | Auction = ADESA: 0 (2.0)
| | | Color = BROWN: 0 (2.0/1.0)
| | | Size = SMALL SUV: 0 (6.0/2.0)
| | | Size = SPORTS
| | | | Auction = MANHEIM: 1 (5.0)
| | | | Auction = OTHER: 1 (0.0)
| | | | Auction = ADESA: 0 (2.0)
| | | Size = SPECIALTY: 1 (0.0)
| | | Size = CROSSOVER: 1 (1.0)
| | VehicleAge > 5: 1 (288.0/97.0)
VehYear > 2005: 0 (440.0/161.0)
```