Teddie Davis (tdavis08@syr.edu) Assignment 2 Summer 663

1.

1.A Convert the image to an integral image

0	0	0	0	0	0	0	1	2	3
0	0	3	6	9	12	15	18	20	22
0	0	6	12	19	26	33	40	46	52
0	0	9	18	28	38	49	60	70	80
0	0	9	19	30	43	58	73	87	101
0	0	9	19	30	47	66	85	100	114
5	10	19	29	40	61	84	107	122	136
10	20	29	39	50	75	102	129	144	158
15	30	39	49	60	85	117	149	164	178
20	40	49	59	70	95	132	169	184	198

1.b Using the integral image, compute the sum of area from (2,2) to (5,7), shaded red above. Show your steps. (10pt)
Taking 85 + 0 – 18 – 0 we get a result of 67

0	0	0	0	0	0	0	1	2	3
0	0	3	6	9	12	15	18	20	22
0	0	6	12	19	26	33	40	46	52
0	0	9	18	28	38	49	60	70	80
0	0	9	19	30	43	58	73	87	101
0	0	9	19	30	47	66	85	100	114
5	10	19	29	40	61	84	107	122	136
10	20	29	39	50	75	102	129	144	158
15	30	39	49	60	85	117	149	164	178
20	40	49	59	70	95	132	169	184	198

2. Using the grayscale image from Question 1, apply the following Haar filter to all positions that are feasible. (20pts)

We get a value of 28

0	0	0	0	0	0	0	1	2	3
0	0	3	6	9	12	15	18	20	22
0	0	6	12	19	26	33	40	46	52
0	0	9	18	28	38	49	60	70	80
0	0	9	19	30	43	58	73	87	101
0	0	9	19	30	47	66	85	100	114
5	10	19	29	40	61	84	107	122	136
10	20	29	39	50	75	102	129	144	158
15	30	39	49	60	85	117	149	164	178
20	40	49	59	70	95	132	169	184	198

A value of 15

0	0	0	0	0	0	0	1	2	3
0	0	3	6	9	12	15	18	20	22
0	0	6	12	19	26	33	40	46	52
0	0	9	18	28	38	49	60	70	80
0	0	9	19	30	43	58	73	87	101
0	0	9	19	30	47	66	85	100	114
5	10	19	29	40	61	84	107	122	136
10	20	29	39	50	75	102	129	144	158
15	30	39	49	60	85	117	149	164	178
20	40	49	59	70	95	132	169	184	198

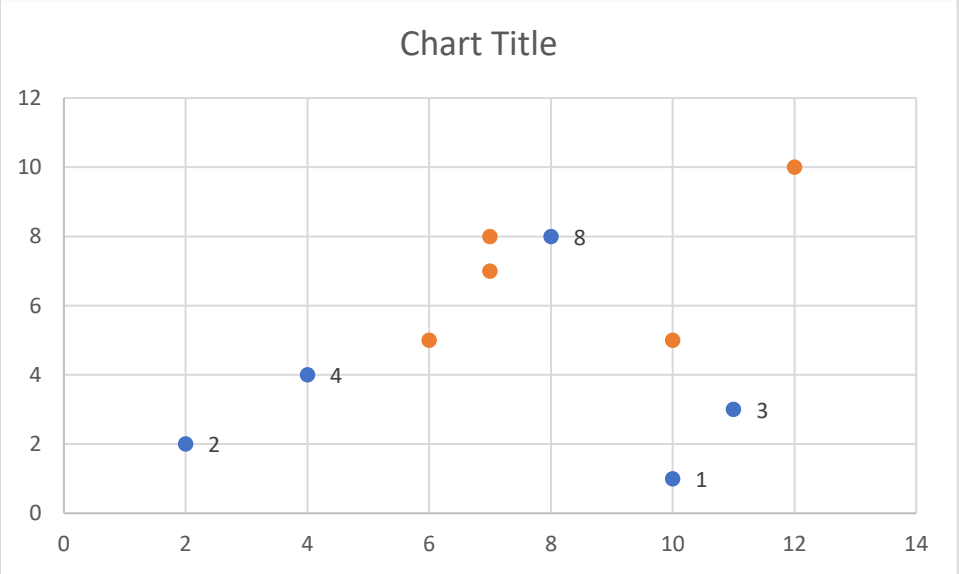
Value of 31:

0	0	0	0	0	0	0	1	2	3
0	0	3	6	9	12	15	18	20	22
0	0	6	12	19	26	33	40	46	52
0	0	9	18	28	38	49	60	70	80
0	0	9	19	30	43	58	73	87	101
0	0	9	19	30	47	66	85	100	114
5	10	19	29	40	61	84	107	122	136
10	20	29	39	50	75	102	129	144	158
15	30	39	49	60	85	117	149	164	178
20	40	49	59	70	95	132	169	184	198

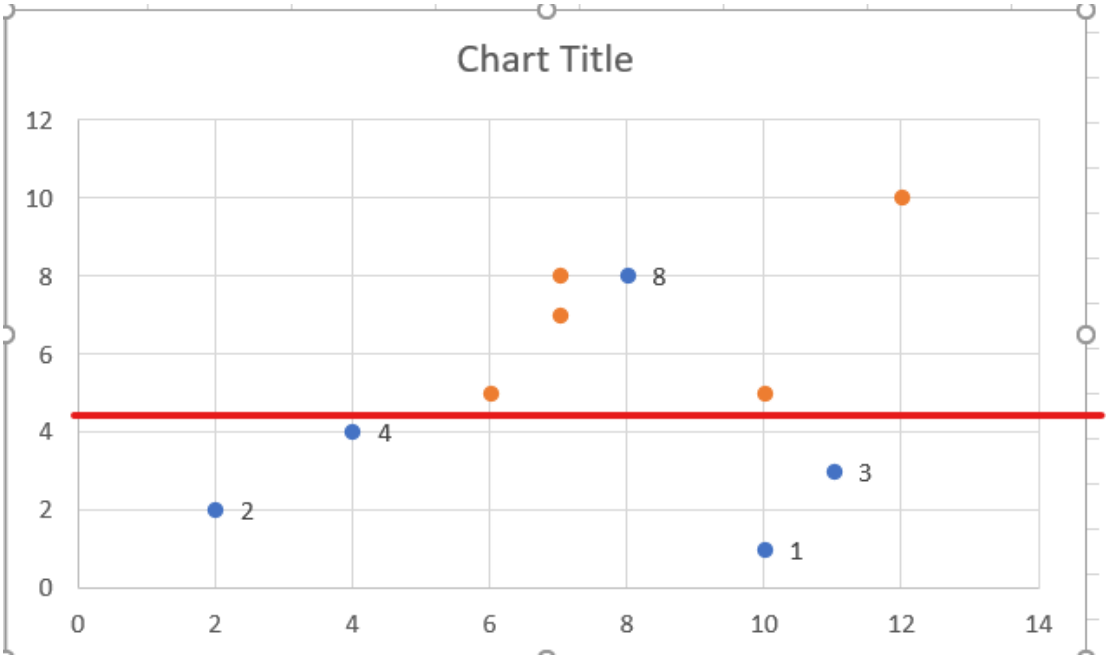
3. In Viola-Jones face detection algorithm, explain what cascading is and why it is important. (20pt)

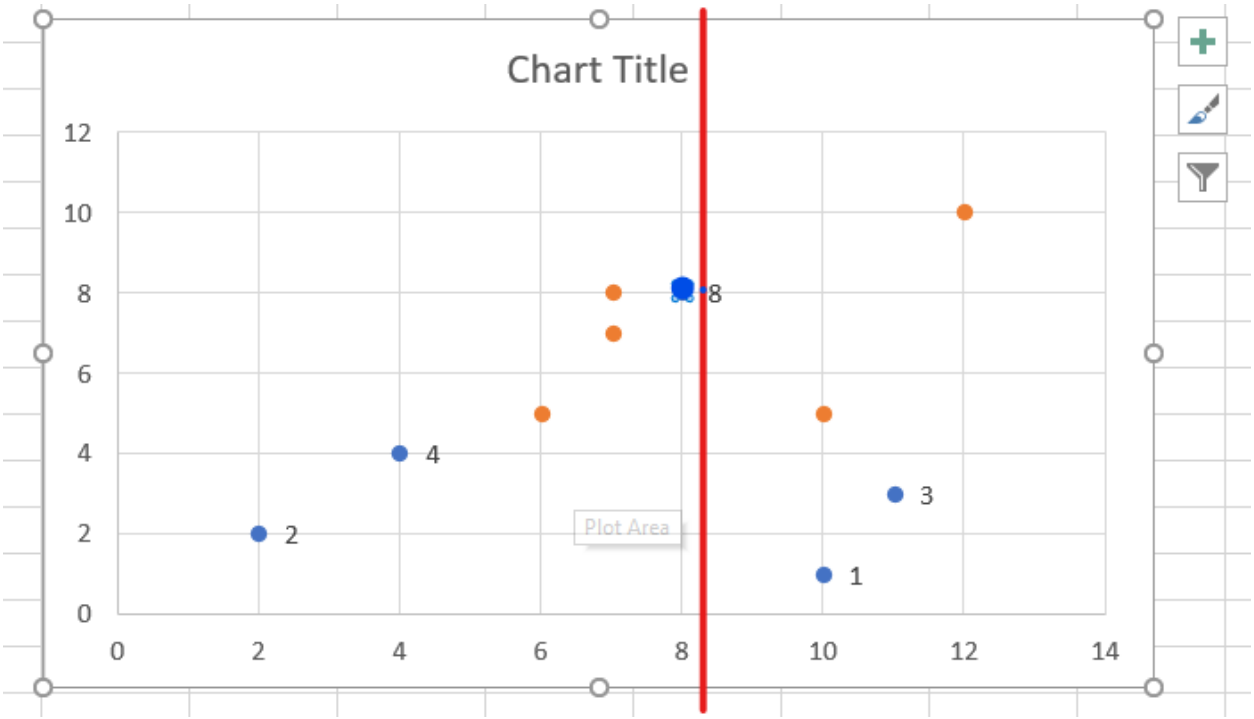
Cascading is when you start with the fastest algorithm, that is normally not as accurate, to start excluding. This onto another algorithm that that is more accurate but is a little slower. You can continue this over multiple different algorithms. The advantage to this is at each set you are lowing the amount of processing needed at each step and this really makes a different when the slower more accurate algorithm has less to process.

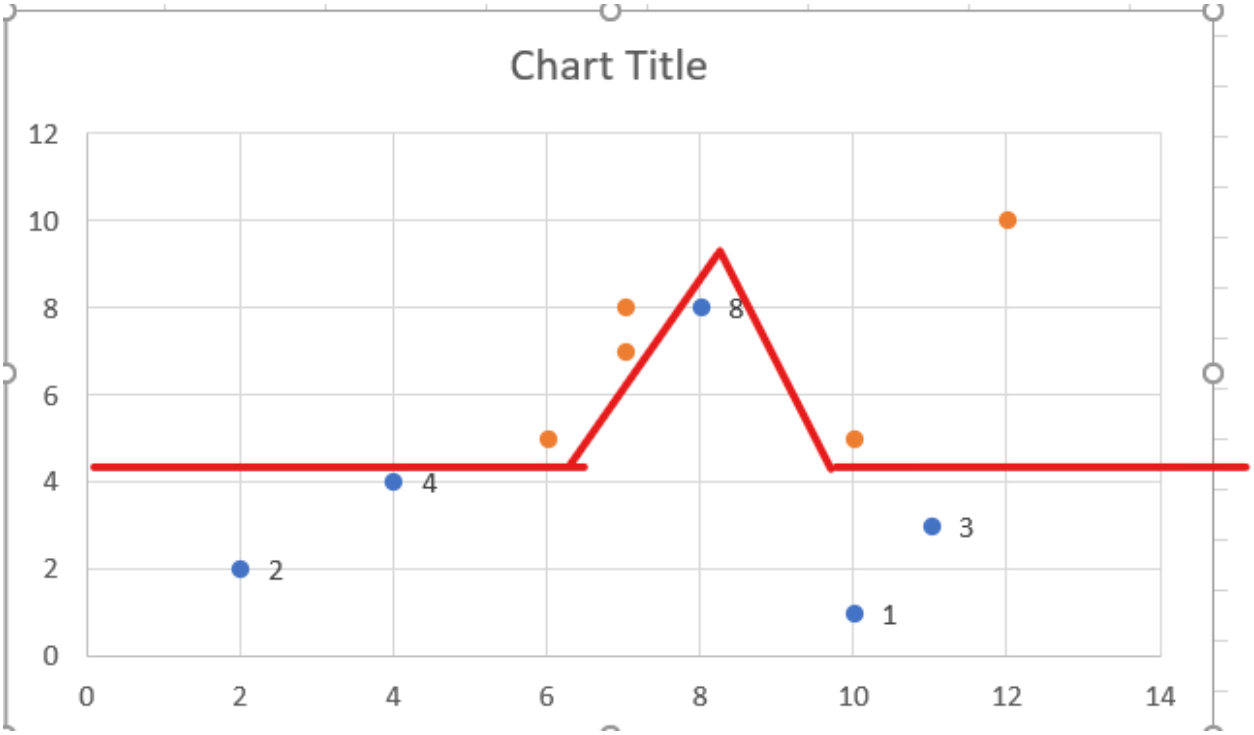
4 Creating a chart based on the data. Blue is for label – and orange is for label +



First AdaBoost level with an error value of .2







5 What is Principle Component Analysis and how does it relate to face recognition? (20pts

It is used as a tool in data analysis and making predictive models by helping find the relative importance of a feature. It can be used transform a set of face images into a set of values of k Eigenfaces.