KNN:
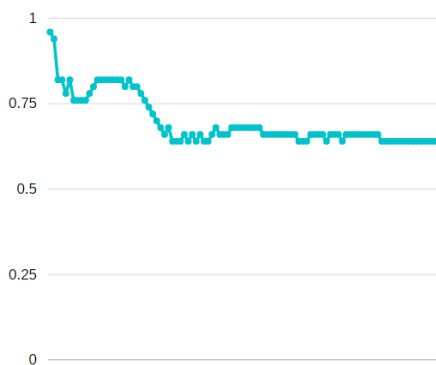**Normalization: Min-Max**
K=2

To determine the accuracy of my code, I created an array from the first 50 examples given, and ran my code 100 times, 50 times (With k=0 all the way to k=50) with values I normalized using Min-Max approach, and another 50 runs of a similar fashion with Z score normalization. I noticed a **SIGNIFICANT** improvement when using Min-Max normalization. So significant that the worst Ks performed with the Min-Max normalization was almost just as precise as the best performed k with the Z-Score normalization. I saw an accuracy of 0.96 when choosing k=1, but since k=2 yielded a close result at 0.94, I opted for k=2 instead.
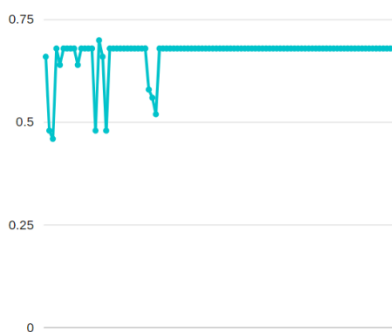
Below are the graphs demonstrating the results.

Min-Max Normalization

```
Best k for KNN is: 1 with a precision of: 0.96

Process finished with exit code 0
```


Z-Score Normalization

```
Best k for KNN is: 16 with a precision of: 0.7

Process finished with exit code 0
```

...

Perceptron:

Shuffling: Got sufficient accuracy without it.
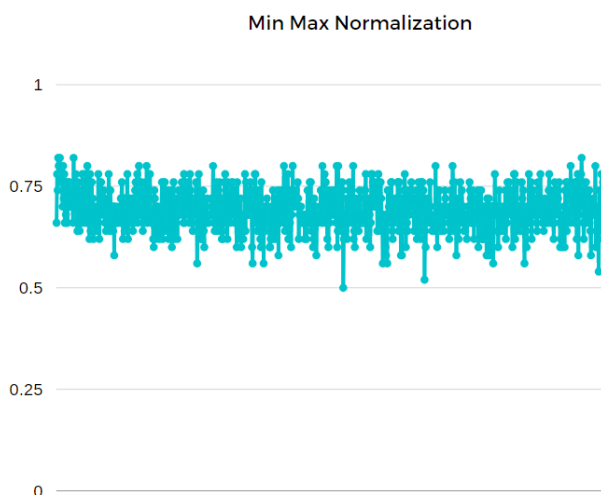**Normalization:** Min-Max
Epochs: 958
Eta: 0.01

My original intention was to run the algorithm for ~1,000,000 times: For each epoch from 1 to 1000 and in each epoch use an eta from 0.001 to 0.999 with 0.001 incremental, I saw however that my plan takes way too long and with a default eta of 0.01 I am getting sufficient results. I got the best result with Min-Max again and the best accuracy of 0.82 on several occasions. I opted for the latest occasion in which I got 0.82, Epoch 958.
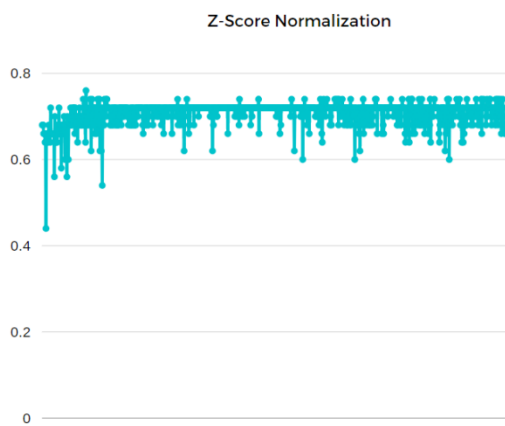

```
Best eta for Perceptron is: 0.01 Best number of epochs are: 95 With a precision of: 0.76

Process finished with exit code 0
```



```
Best eta for Perceptron is: 0.01 Best number of epochs are: 4 With a precision of: 0.82

Process finished with exit code 0
```

Passive Aggressive:

Shuffling: Got sufficient accuracy without it.
Normalization: Min-Max
Epochs: 780

In order to find the ideal amount of Epochs as well as the better Normalization, I had 2,000 runs on my algorithm, running with 1 epoch all the way to 1,000 epochs with both ZScore and Min Max. Although both normalizations yielded more than sufficient results, my effort with the Min-Max normalization was more fruitful. See results below. Additionally, since I had a validation set of the size of 50, and although I received the best result when doing 2 epochs only, I felt that when running more epochs, I am getting good results more stably; hence I opted for 780 epochs, which ended with an accuracy of 0.78 or 39 hits out of 50.
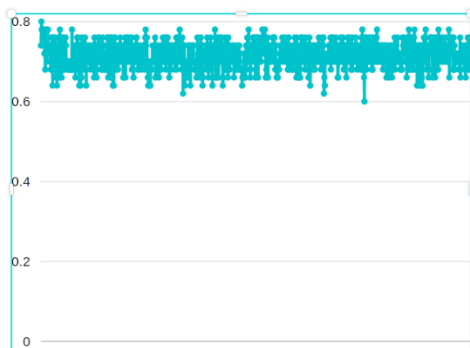
Z-Score Normalization
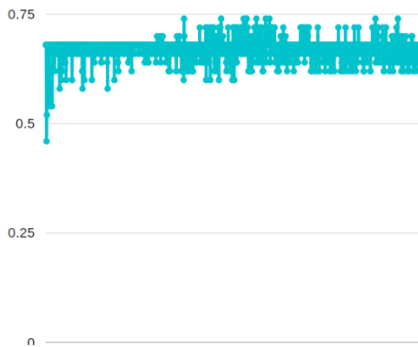
```
Best Epoch is: 370With a precision of: 0.74

Process finished with exit code 0
```

Min Max Normalization

```
Best Epoch is: 2With a precision of: 0.8

Process finished with exit code 0
```

...

" Non ho l'età, non ho l'età
Per amarti, non ho l'età
Per uscire sola con te."
—Non Ho L'età, Gigliola Cinquetti, 1964.