CIFAR10 Dataset Visualization:

R Fold-Cross-Validation Result:

```
for i in d:
  print("k = {} : accuracies = {}".format(i,d[i]))
```

```
k = 1 : accuracies = [0.373, 0.404, 0.3885, 0.3855, 0.401]
k = 3 : accuracies = [0.4015, 0.413, 0.4, 0.413, 0.432]
k = 5 : accuracies = [0.4275, 0.427, 0.427, 0.4355, 0.443]
k = 7 : accuracies = [0.439, 0.418, 0.438, 0.4325, 0.452]
k = 9 : accuracies = [0.443, 0.431, 0.454, 0.4375, 0.4535]
k = 11 : accuracies = [0.443, 0.429, 0.442, 0.442, 0.4545]
k = 13 : accuracies = [0.451, 0.4275, 0.4415, 0.4385, 0.461]
k = 15 : accuracies = [0.449, 0.43, 0.446, 0.433, 0.4605]
k = 17 : accuracies = [0.448, 0.4315, 0.439, 0.435, 0.4555]
k = 19 : accuracies = [0.45, 0.426, 0.437, 0.4345, 0.448]
k = 21 : accuracies = [0.449, 0.4255, 0.4445, 0.436, 0.4505]
```

Optimal K value and its confusion matrix for test set predictions:

```
[ ]  ans = 0
     m = 0
     for i in d:
       if sum(d[i])>m:
         m = sum(d[i])
         ans = i
     print("optimal k value = ",ans)
```

```
optimal k value =  13
```

```
Confusion Matrix:
[[35  3  6  0 22  1 12  2 21  1]
 [ 2 52  0  0  6  0 18  0  6  5]
 [ 2  1 28  4 21 12 27  2  3  0]
 [ 0  2  3 16 38  9 28  2  3  2]
 [ 2  1  4  4 55  0 21  1  0  2]
 [ 0  2  3  5 31 15 26  2  0  2]
 [ 0  1  1  1 11  4 93  0  0  1]
 [ 0  2  3  4 23  3 14 48  1  4]
 [ 9  6  3  0  7  2  6  0 70  3]
 [ 3 12  0  3 16  1 15  1  7 51]]
```

Accuracy score and testing, training error for optimal K value:

```
print(accuracy_score(y_test2,y_pred))
```

```
0.463
```

```
print("Testing Error {}".format(1-accuracy_score(y_test2,y_pred)))
y_pred = classifier.predict(x_train2)
print("Training Error {}".format(1-accuracy_score(y_train2,y_pred)))
```

```
Testing Error 0.5369999999999999
Training Error 0.4557
```

Precision Recall curve for the Optimal K value: