In [14]:
```
# import random search, random forest, iris data, and distributions

%matplotlib notebook
from sklearn.model_selection import cross_validate
from sklearn import datasets
from sklearn.ensemble import RandomForestClassifier
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_digits
%matplotlib notebook
import numpy as np
import pandas as pd
import seaborn as sn
import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split
from sklearn.datasets import make_classification, make_blobs
from matplotlib.colors import ListedColormap
```

possible used library [https://aaronmams.github.io/A-quick-and-dirty-machine-learning-post-with-Python-and-scikit-learn/ (https://aaronmams.github.io/A-quick-and-dirty-machine-learning-post-with-Python-and-scikit-learn/)](https://aaronmams.github.io/A-quick-and-dirty-machine-learning-post-with-Python-and-scikit-learn/)

In [15]:
```
import pandas as pd
data = pd.read_csv('HaitiPixels_good_01.csv')
data.head()
```

Out[15]:

	Type	Red	Green	Blue
0	0	104	89	63
1	0	101	80	60
2	0	103	87	69
3	0	107	93	72
4	0	109	99	68

In [5]:
```
from sklearn import datasets
X=data[['Red', 'Green', 'Blue']]  # Features
y=data['Type']  # Labels
X.columns = ['Red','Green','Blue']
y.columns = ['Target']
```

[https://www.kaggle.com/diegosch/classifier-evaluation-using-confusion-matrix (https://www.kaggle.com/diegosch/classifier-evaluation-using-confusion-matrix)](https://www.kaggle.com/diegosch/classifier-evaluation-using-confusion-matrix)

In [19]:
```
# Split dataset into training set and test set
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3) # 70% tı
```

In [20]:
```
from sklearn.tree import DecisionTreeClassifier

# Make a decision tree and train
tree = DecisionTreeClassifier(random_state=1)
tree.fit(X, y)
```

Out[20]:
```
DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                       max_features=None, max_leaf_nodes=None,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, presort=False,
                       random_state=1, splitter='best')
```

In [21]:
```
from sklearn.ensemble import RandomForestClassifier

# Create the model with 100 trees
model = RandomForestClassifier(n_estimators=100,
                               bootstrap = True,
                               max_features = 'sqrt')
# Fit on training data
model.fit(X_train, y_train)
```

Out[21]:
```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
                       max_depth=None, max_features='sqrt', max_leaf_nodes=Non
e,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, n_estimators=100,
                       n_jobs=None, oob_score=False, random_state=None,
                       verbose=0, warm_start=False)
```

In [26]:
```
# Actual class predictions
rf_predictions = model.predict(X_test)
# Probabilities for each class
rf_probs = model.predict_proba(X_test)[:, 1]
```

In [29]:
```
from sklearn.metrics import roc_auc_score

# Calculate roc auc
roc_value = roc_auc_score(y_test, rf_probs)
roc_value
```

Out[29]:
```
0.9992394839340794
```

Type *Markdown* and LaTeX: α^2

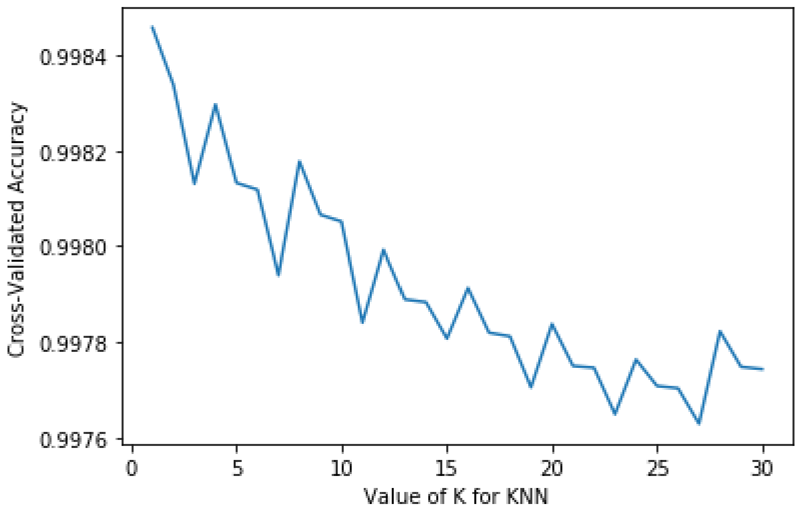
In [30]:
```
# build KNN model and choose n_neighbors = 5
knn = KNeighborsClassifier(n_neighbors = 5)
# train the model
knn.fit(X_train, y_train)
# get the predict value from X_test
y_pred = knn.predict(X_test)
# print the score
print('accuracy: ', knn.score(X_test, y_test))
```

```
accuracy:  0.9998474122063877
```

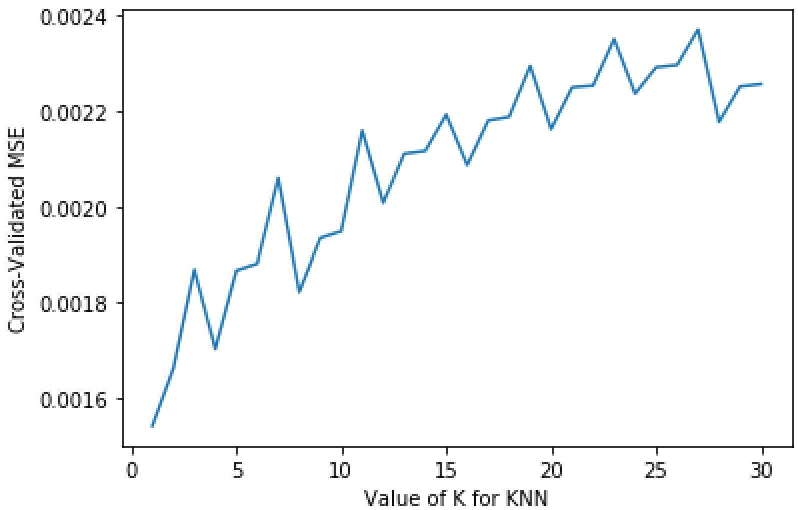
In [32]:
```
# import k-folder
from sklearn.model_selection import cross_val_score
# use the same model as before
knn = KNeighborsClassifier(n_neighbors = 5)
# X,y will automatically devided by 5 folder, the scoring I will still use the ac
scores = cross_val_score(knn, X, y, cv=5, scoring='accuracy')
# print all 5 times scores
print(scores)
# [ 0.96666667  1.          0.93333333  0.96666667  1.        ]
# then I will do the average about these five scores to get more accuracy score.
print(scores.mean())
# 0.973333333333
```

```
[1.   1.   1.   1.   0.99]
0.9981326953038054
```

In [33]:
```
import matplotlib.pyplot as plt
%matplotlib inline
# choose k between 1 to 31
k_range = range(1, 31)
k_scores = []
# use iteration to caclulator different k in models, then return the average accu
for k in k_range:
    knn = KNeighborsClassifier(n_neighbors=k)
    scores = cross_val_score(knn, X, y, cv=5, scoring='accuracy')
    k_scores.append(scores.mean())
# plot to see clearly
plt.plot(k_range, k_scores)
plt.xlabel('Value of K for KNN')
plt.ylabel('Cross-Validated Accuracy')
plt.show()
```



In [34]:
```
import matplotlib.pyplot as plt
k_range = range(1, 31)
k_scores = []
for k in k_range:
    knn = KNeighborsClassifier(n_neighbors=k)
    loss = abs(cross_val_score(knn, X, y, cv=5, scoring='neg_mean_squared_error'
    k_scores.append(loss.mean())
plt.plot(k_range, k_scores)
plt.xlabel('Value of K for KNN')
plt.ylabel('Cross-Validated MSE')
plt.show()
```



In [ ]: