DATA MINING
DIGITAL ASSIGNMENT - 05

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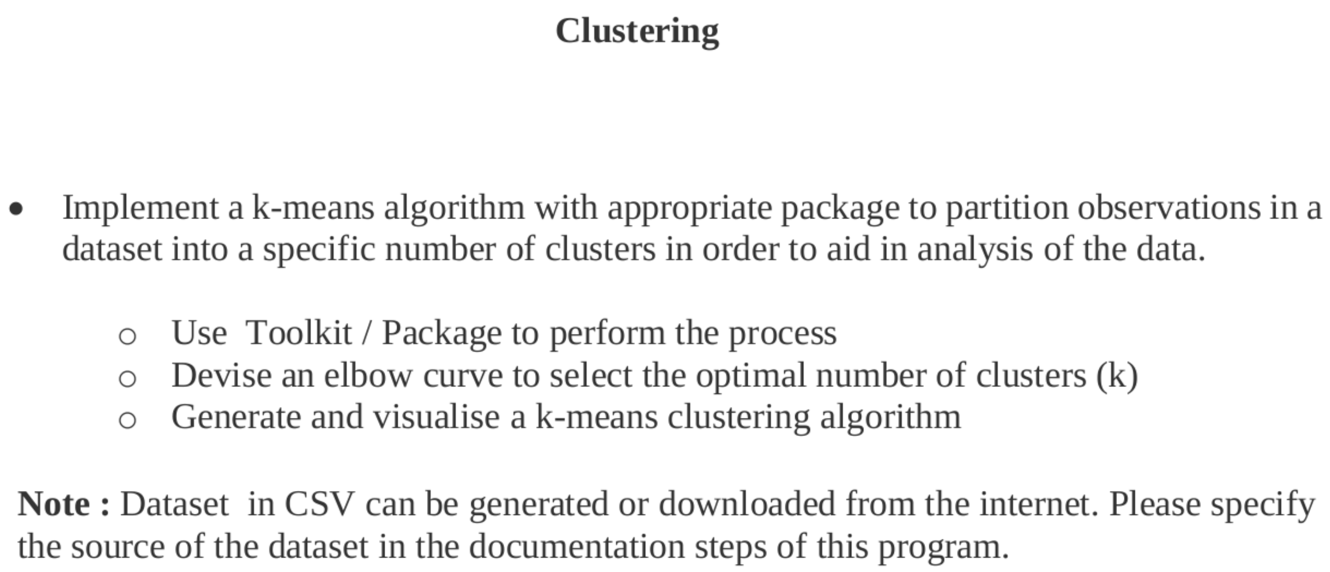


Clustering

- Implement a k-means algorithm with appropriate package to partition observations in a dataset into a specific number of clusters in order to aid in analysis of the data.
    - Use Toolkit / Package to perform the process
    - Devise an elbow curve to select the optimal number of clusters (k)
    - Generate and visualise a k-means clustering algorithm

Note : Dataset in CSV can be generated or downloaded from the internet. Please specify the source of the dataset in the documentation steps of this program.

DATA SET USED: Titanic dataset from Kaggle

DATA SET LINK:
`http://s3.amazonaws.com/assets.datacamp.com/course/Kaggle/train.csv`

In [1]:

```
import pandas as pd
import numpy as np
from sklearn.cluster import KMeans
from sklearn.preprocessing import LabelEncoder
from sklearn.preprocessing import MinMaxScaler
import seaborn as sns
import matplotlib.pyplot as plt

```

In [2]:

```
data=pd.read_csv("http://s3.amazonaws.com/assets.datacamp.com/course/Kaggle/train.csv")
```

In [4]:

```
from sklearn.model_selection import train_test_split
train, test = train_test_split(data, test_size = 0.3, random_state = 100)
```

In [6]:

```
print(train.columns.values)
```

```
['PassengerId' 'Survived' 'Pclass' 'Name' 'Sex' 'Age' 'SibSp' 'Parch'
 'Ticket' 'Fare' 'Cabin' 'Embarked']
```

In [7]:

```
print("Missing values in training set:")
print(train.isna().sum())
print("\n")
print("Missing values in testing set:")
print(test.isna().sum())
```

```
Missing values in training set:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            128
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          473
Embarked         1
dtype: int64


Missing values in testing set:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age             49
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          214
Embarked         1
dtype: int64
```

In [11]:

```
# Replacing missing values by mean imputation, ie, with mean column values
train.fillna(train.mean(), inplace=True)
test.fillna(test.mean(), inplace=True)
```

```
/home/abhirupa/anaconda3/lib/python3.7/site-packages/pandas/core/generic.py:5434: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/indexing.html#indexing-view-versus-co
py
  self._update_inplace(new_data)
```

In [12]:

```
print("Missing values in training set:")
print(train.isna().sum())
print("\n")
print("Missing values in testing set:")
print(test.isna().sum())
```

```
Missing values in training set:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age              0
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          473
Embarked         1
dtype: int64
```

```
Missing values in testing set:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age              0
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          214
Embarked         1
dtype: int64
```

In [13]:

```python
# Dropping non-numeric data fields
train = train.drop(['Name','Ticket', 'Cabin','Embarked'], axis=1)
test = test.drop(['Name','Ticket', 'Cabin','Embarked'], axis=1)
```

In [14]:

```python
# Use label encoding to convert 'Sex' feature into numeric format
labelEncoder = LabelEncoder()
labelEncoder.fit(train['Sex'])
labelEncoder.fit(test['Sex'])
train['Sex'] = labelEncoder.transform(train['Sex'])
test['Sex'] = labelEncoder.transform(test['Sex'])

```

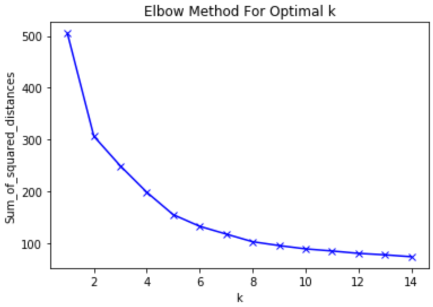
In [22]:

```python
mms = MinMaxScaler()
mms.fit(train)
data_transformed = mms.transform(train)

Sum_of_squared_distances = []
K = range(1,15)
for k in K:
    km = KMeans(n_clusters=k)
    km = km.fit(data_transformed)
    Sum_of_squared_distances.append(km.inertia_)

plt.plot(K, Sum_of_squared_distances, 'bx-')
plt.xlabel('k')
plt.ylabel('Sum_of_squared_distances')
plt.title('Elbow Method For Optimal k')
plt.show()

# k=5
```



In [59]:

```python
from sklearn.metrics import accuracy_score
# Dropping the feature that is to be tested
X = np.array(train.drop(['Survived'], 1).astype(float))
y = np.array(train['Survived'])
xtest= np.array(test.drop(['Survived'], 1).astype(float))
ytest= np.array(test['Survived'])

```

In [58]:

```python
kmeans = KMeans(n_clusters=2) # You want cluster the passenger records into 2: Survived or Not survived
kmeans.fit(X)
print(kmeans.cluster_centers_)
print(kmeans.labels_)
correct = 0
for i in range(len(X)):
    predict_me = np.array(X[i].astype(float))
    predict_me = predict_me.reshape(-1, len(predict_me))
    prediction = kmeans.predict(predict_me)
    if prediction[0] == y[i]:
        correct += 1

print("ACCURACY:",correct/len(X))
```

```
[[6.73725552e+02 2.28075710e+00 6.84542587e-01 3.12424338e+01
  4.73186120e-01 3.31230284e-01 3.16731726e+01]
 [2.24055556e+02 2.30065359e+00 6.07843137e-01 2.88393791e+01
  6.14379085e-01 4.11764706e-01 3.39641464e+01]]
[1 1 0 1 0 0 1 0 1 0 1 0 1 1 1 1 1 0 1 0 1 0 0 1 1 1 0 0 0 0 1 0 0 0 0 1 0
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 1 0 0 0 1 1 0 1 1 1 0 0 0 1 1 0 1 0 0 0 0 0 1 0 1 1 0 0 0 0 0]
ACCURACY: 0.5296950240770465
```

In [ ]: