In this assignment students have to transform iris data into 3 dimensions and plot a 3d chart with transformed dimensions and colour each data point with specific class.

Hint:

import numpy as np

import matplotlib.pyplot as plt

from mpl_toolkits.mplot3d import Axes3D

from sklearn import decomposition

from sklearn import datasets

In [14]:

```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
from sklearn import decomposition
```

In [15]:

```
from sklearn.datasets import load_iris
```

In [16]:

```
df = load_iris()
df
```

Out[16]:

```
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mber of Attributes: 4 numeric, predictive attributes and the class\n    :Attribute Inform
ation:\n        - sepal length in cm\n        - sepal width in cm\n        - petal lengt
h in cm\n        - petal width in cm\n        - class:\n                - Iris-Setosa\n
- Iris-Versicolour\n                - Iris-Virginica\n                \n    :Summary Sta
tistics:\n\n    ============== ==== ==== ======= ===== ====================\n
Min  Max   Mean    SD   Class Correlation\n    ============== ==== ==== ======= ===== ===
==================\n    sepal length:   4.3  7.9   5.84   0.83    0.7826\n    sepal width:
2.0  4.4   3.05   0.43   -0.4194\n    petal length:   1.0  6.9   3.76   1.76    0.9490  (
```

high!)\n   petal width: 0.1 2.5   1.20   0.76   0.9565 (high!)\n   ==========
==== ==== ======= ===== ====================\n\n   :Missing Attribute Values: None\n
:Class Distribution: 33.3% for each of 3 classes.\n   :Creator: R.A. Fisher\n   :Donor:
Michael Marshall (MARSHALL%PLU@io.arc.nasa.gov)\n   :Date: July, 1988\n\nThe famous Iris
database, first used by Sir R.A. Fisher. The dataset is taken\nfrom Fisher\'s paper. Note
that it\'s the same as in R, but not as in the UCI\nMachine Learning Repository, which ha
s two wrong data points.\n\nThis is perhaps the best known database to be found in the\np
attern recognition literature. Fisher\'s paper is a classic in the field and\nis referen
ced frequently to this day. (See Duda & Hart, for example.) The\ndata set contains 3 cl
asses of 50 instances each, where each class refers to a\ntype of iris plant. One class
is linearly separable from the other 2; the\nlatter are NOT linearly separable from each
other.\n\n.. topic:: References\n\n   - Fisher, R.A. "The use of multiple measurements in
taxonomic problems"\n   Annual Eugenics, 7, Part II, 179-188 (1936); also in "Contribut
ions to\n   Mathematical Statistics" (John Wiley, NY, 1950).\n   - Duda, R.O., & Hart,
P.E. (1973) Pattern Classification and Scene Analysis.\n   (Q327.D83) John Wiley & Sons
. ISBN 0-471-22361-1. See page 218.\n   - Dasarathy, B.V. (1980) "Nosing Around the Nei
ghborhood: A New System\n   Structure and Classification Rule for Recognition in Partia
lly Exposed\n   Environments". IEEE Transactions on Pattern Analysis and Machine\n
Intelligence, Vol. PAMI-2, No. 1, 67-71.\n   - Gates, G.W. (1972) "The Reduced Nearest Ne
ighbor Rule". IEEE Transactions\n   on Information Theory, May 1972, 431-433.\n   - Se
e also: 1988 MLC Proceedings, 54-64. Cheeseman et al"s AUTOCLASS II\n   conceptual clu
stering system finds 3 classes in the data.\n   - Many, many more ...',
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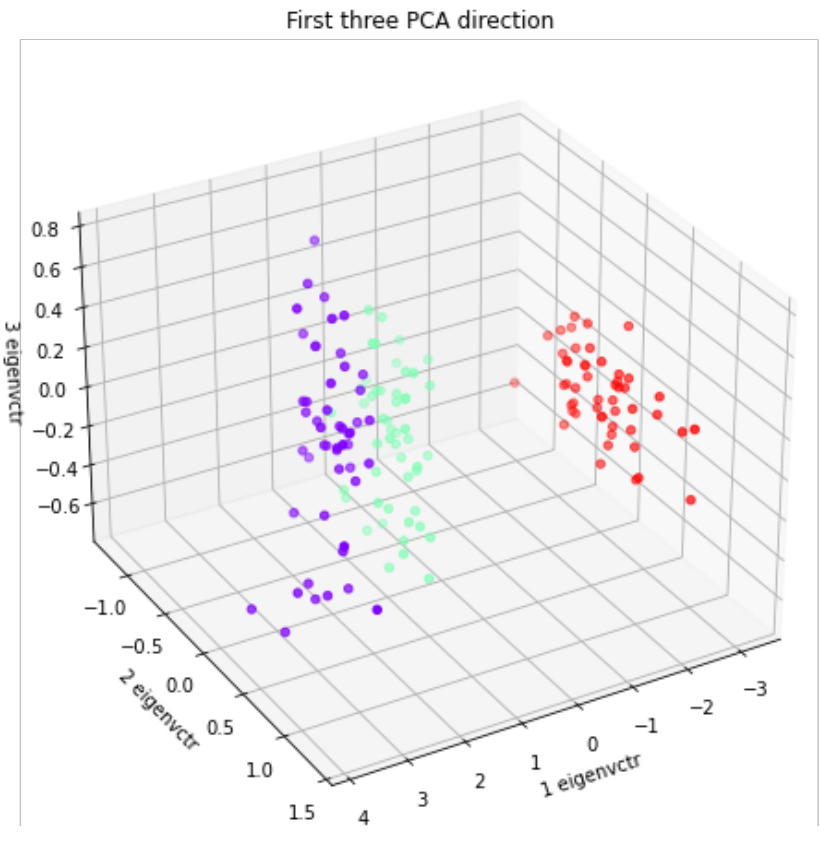
In [17]:

```
from sklearn.decomposition import PCA
```

In [18]:

```
X_reduced = PCA(n_components = 3).fit_transform(df.data)
Y = df.target
fig = plt.figure(1,figsize=(8,6))
axs = Axes3D(fig,elev=30,azim=60)
axs.scatter(X_reduced[:,0],X_reduced[:,1],X_reduced[:,2],c=Y,cmap = plt.cm.rainbow_r)
axs.set_title("First three PCA direction")
axs.set_xlabel("1 eigenvctr")
axs.set_ylabel("2 eigenvctr")
axs.set_zlabel("3 eigenvctr")
plt.show()
```



In [ ]: