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In [1]: import sys
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
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In [2]: # Read the input files
nasdaq00FileName = 'nasdaq00.txt'
nasdaq01FileName = 'nasdaq01.txt'

nasd00, nasd01 = [], []
with open(nasdaq00FileName) as inFile1, open(nasdaq01FileName) as inFile2:
    for line in inFile1:
        nasd00.append(float(line.strip()))
    for line in inFile2:
        nasd01.append(float(line.strip()))
```

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In [20]: # 4.4a
def getMatrices(nasdaq):
    Xt = np.asarray(nasdaq[3:])
    priors = []
    for i in range(len(nasdaq)-3):
        priors.append([nasdaq[i+2], nasdaq[i+1], nasdaq[i]])
    priors = np.array(priors)
    return Xt, priors

Xt00, givens00 = getMatrices(nasd00)

def getWeights(Xt, givens):
    invA = np.linalg.inv(np.dot(givens.transpose(), givens))
    b = np.dot(givens.transpose(), Xt)
    weights = np.dot(invA, b)
    return(weights)

weights00 = getWeights(Xt00, givens00)
print("(a1, a2, a3) = (%f, %f, %f) " % (weights00[0], weights00[1], weights00[2]))

(a1, a2, a3) = (0.950673, 0.015601, 0.031896)
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In [48]: # 4.4b
from statistics import mean
Xt01, givens01 = getMatrices(nasd01)

pred00 = np.sum(givens00*np.tile(weights00,(len(Xt00),1)), axis=1)
pred01 = np.sum(givens01*np.tile(weights00,(len(Xt01),1)), axis=1)
mse00 = ((pred00-np.asarray(nasd00[3:]))**2).mean()
mse01 = ((pred01-np.asarray(nasd01[3:]))**2).mean()
print('Year2000, MSE = %f' % mse00)
print('Year2001, MSE = %f' % mse01)

Year2000, MSE = 13902.401076
Year2001, MSE = 2985.097924
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