ScratchKNN

June 16, 2021

```python
[2]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt # Import the matplotlib module
     from math import sqrt
```

```python
[3]: df = pd.read_excel("Online Retail.xlsx")
```

```python
[4]: df.head(5)
```

```
[4]:   InvoiceNo StockCode                          Description  Quantity  \
     0    536365    85123A   WHITE HANGING HEART T-LIGHT HOLDER         6
     1    536365     71053                  WHITE METAL LANTERN         6
     2    536365    84406B       CREAM CUPID HEARTS COAT HANGER         8
     3    536365    84029G  KNITTED UNION FLAG HOT WATER BOTTLE         6
     4    536365    84029E       RED WOOLLY HOTTIE WHITE HEART.         6

               InvoiceDate  UnitPrice  CustomerID         Country
     0 2010-12-01 08:26:00       2.55     17850.0  United Kingdom
     1 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
     2 2010-12-01 08:26:00       2.75     17850.0  United Kingdom
     3 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
     4 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
```

```python
[5]: df.columns
```

```
[5]: Index(['InvoiceNo', 'StockCode', 'Description', 'Quantity', 'InvoiceDate',
            'UnitPrice', 'CustomerID', 'Country'],
           dtype='object')
```

```python
[6]: df = df.drop(columns=['InvoiceNo', 'StockCode', 'Description' , 'InvoiceDate'
     ↪,'CustomerID', 'Country'])
```

```python
[7]: df =  df.head(1000)
```

```python
[8]: x = df["Quantity"]
     y = df["UnitPrice"]
```

```
[9]: print(type(df["Quantity"]))
```

```
<class 'pandas.core.series.Series'>
```
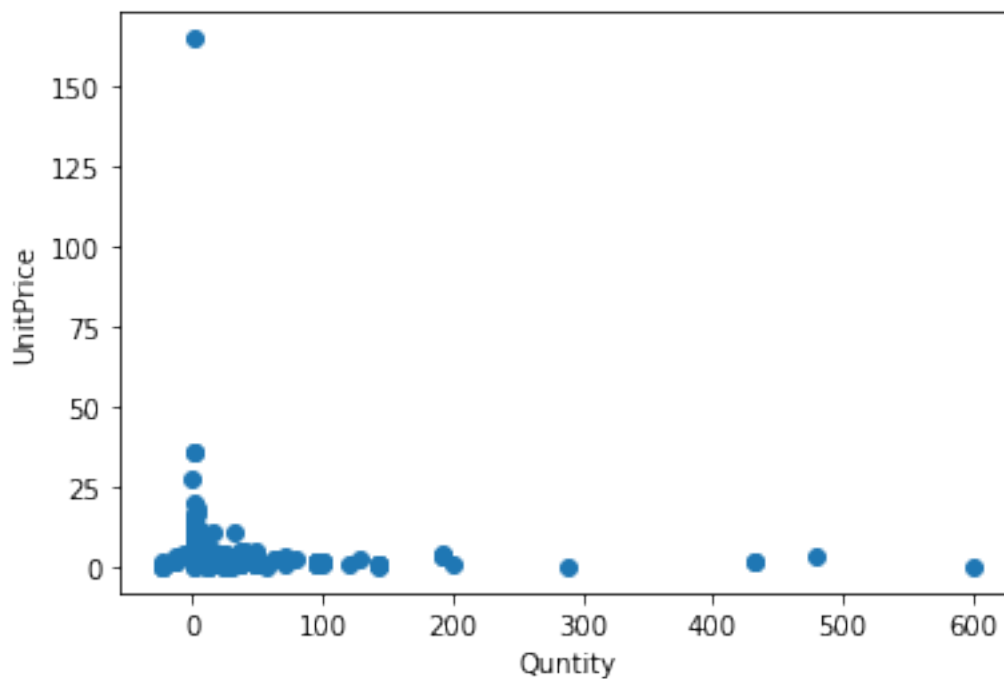
```
[10]: y
```

```
[10]: 0      2.55
      1      3.39
      2      2.75
      3      3.39
      4      3.39
             ...
      995    1.65
      996    1.25
      997    1.25
      998    2.55
      999    1.25
      Name: UnitPrice, Length: 1000, dtype: float64
```

```
[11]: plt.xlabel("Quntity")
      plt.ylabel("UnitPrice")
      plt.scatter(df["Quantity"],df["UnitPrice"])
```

```
[11]: <matplotlib.collections.PathCollection at 0x7ff90cece610>
```

```
[146]: ## Determine the value of k

       k = np.random.randint(1,5)
```

```
[147]: ## Selecting Ranomly centeroid from the given co - ordinates
```

```
[148]: df.shape
```

```
[148]: (1000, 2)
```

```
[149]: print(len(df["Quantity"]))
```

```
       1000
```

```
[150]: centeriods = []
       for i in range(k):
           x = np.random.randint(0,len(df["Quantity"]))
           y = np.random.randint(0,len(df["Quantity"]))
           centeriods.append((df["Quantity"][x],df["Quantity"][y]))

       centeriods
```

```
[150]: [(3, 12)]
```

```
[151]: centeriods[0]
```

```
[151]: (3, 12)
```

```
[152]: ## Making Cluster base on these centeriod
```

```
[153]: def calc_distance(p1, p2): # simple function, I hope you are more comfortable
           return sqrt((p1[0]-p2[0])**2+(p1[1]-p2[1])**2) # Pythagorean theorem


       cluster={} ## key ->> centeriod and value --> cluster values
       for centeriod in centeriods:
           print("Centeriods --> ",centeriod)
           cluster[centeriod]=[]
           for p in range(0,len(df["Quantity"])):
               x1 = df["Quantity"][p]
               y1 = df["UnitPrice"][p]

       #         print("Points : ",(x1,y1))
               point = (x1,y1)
               dist = calc_distance(point,centeriod) #distance btw certeriod and point
               cluster[centeriod].append(((p,p),dist))
```

```
Centeriods -->  (3, 12)
```

[154]:
```python
## now we have cluster dict where key as centeriod and values is the list in␣
 ↪whihc point and their distance
## our task take the mininum of point from the centeriod
```

[155]:
```python
def calc_distance(p1, p2): # simple function, I hope you are more comfortable
    return sqrt((p1[0]-p2[0])**2+(p1[1]-p2[1])**2) # Pythagorean theorem

def sort(dist):
    print(dist)
    dist.sort(key=lambda x:x[1])
    print("sorted dist ",dist)
    return dist

for cls in centeriods:

    cluster[cls] = []
# cluster={
#     (12, 1) : [],
#     (6, 2) : [],
#     (10, 1) : []
# } ## key ->> centeriod and value --> cluster values

dist= []
for p in range(0,len(df["Quantity"])):
    x1 = df["Quantity"][p]
    y1 = df["UnitPrice"][p]
    dist = []
    for centeriod in centeriods:
        print("Centeriods {} point {} ".format(centeriod , (x1,y1)))


        distance = calc_distance(centeriod ,(x1,y1))
        dist.append((centeriod,distance))
        print(dist)
    sorted_dist = sort(dist) ## centeriod with distance

    cluster[sorted_dist[0][0]].append((x1,y1)) ## insert into the cluster
```

```
Centeriods (3, 12) point (6, 2.55)
[((3, 12), 9.914761721796443)]
```

4

```
[((3, 12), 9.914761721796443)]
sorted dist  [((3, 12), 9.914761721796443)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (8, 2.75)
[((3, 12), 10.514870422406545)]
[((3, 12), 10.514870422406545)]
sorted dist  [((3, 12), 10.514870422406545)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (2, 7.65)
[((3, 12), 4.4634627812943615)]
[((3, 12), 4.4634627812943615)]
sorted dist  [((3, 12), 4.4634627812943615)]
Centeriods (3, 12) point (6, 4.25)
[((3, 12), 8.31038506929733)]
[((3, 12), 8.31038506929733)]
sorted dist  [((3, 12), 8.31038506929733)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (32, 1.69)
[((3, 12), 30.778175709421117)]
[((3, 12), 30.778175709421117)]
sorted dist  [((3, 12), 30.778175709421117)]
Centeriods (3, 12) point (6, 2.1)
[((3, 12), 10.34456378974)]
[((3, 12), 10.34456378974)]
sorted dist  [((3, 12), 10.34456378974)]
Centeriods (3, 12) point (6, 2.1)
[((3, 12), 10.34456378974)]
[((3, 12), 10.34456378974)]
sorted dist  [((3, 12), 10.34456378974)]
Centeriods (3, 12) point (8, 3.75)
[((3, 12), 9.64689069078737)]
```

```
[((3, 12), 9.64689069078737)]
sorted dist  [((3, 12), 9.64689069078737)]
Centeriods (3, 12) point (6, 1.65)
[((3, 12), 10.776015033397085)]
[((3, 12), 10.776015033397085)]
sorted dist  [((3, 12), 10.776015033397085)]
Centeriods (3, 12) point (6, 4.25)
[((3, 12), 8.31038506929733)]
[((3, 12), 8.31038506929733)]
sorted dist  [((3, 12), 8.31038506929733)]
Centeriods (3, 12) point (3, 4.95)
[((3, 12), 7.05)]
[((3, 12), 7.05)]
sorted dist  [((3, 12), 7.05)]
Centeriods (3, 12) point (2, 9.95)
[((3, 12), 2.2808989455914093)]
[((3, 12), 2.2808989455914093)]
sorted dist  [((3, 12), 2.2808989455914093)]
Centeriods (3, 12) point (3, 5.95)
[((3, 12), 6.05)]
[((3, 12), 6.05)]
sorted dist  [((3, 12), 6.05)]
Centeriods (3, 12) point (3, 5.95)
[((3, 12), 6.05)]
[((3, 12), 6.05)]
sorted dist  [((3, 12), 6.05)]
Centeriods (3, 12) point (4, 7.95)
[((3, 12), 4.17163037672323)]
[((3, 12), 4.17163037672323)]
sorted dist  [((3, 12), 4.17163037672323)]
Centeriods (3, 12) point (4, 7.95)
[((3, 12), 4.17163037672323)]
[((3, 12), 4.17163037672323)]
sorted dist  [((3, 12), 4.17163037672323)]
Centeriods (3, 12) point (6, 4.25)
[((3, 12), 8.31038506929733)]
[((3, 12), 8.31038506929733)]
sorted dist  [((3, 12), 8.31038506929733)]
Centeriods (3, 12) point (3, 4.95)
[((3, 12), 7.05)]
[((3, 12), 7.05)]
sorted dist  [((3, 12), 7.05)]
Centeriods (3, 12) point (3, 4.95)
[((3, 12), 7.05)]
[((3, 12), 7.05)]
sorted dist  [((3, 12), 7.05)]
Centeriods (3, 12) point (3, 4.95)
[((3, 12), 7.05)]
```

```
[((3, 12), 7.05)]
sorted dist  [((3, 12), 7.05)]
Centeriods (3, 12) point (3, 5.95)
[((3, 12), 6.05)]
[((3, 12), 6.05)]
sorted dist  [((3, 12), 6.05)]
Centeriods (3, 12) point (24, 3.75)
[((3, 12), 22.562413434736985)]
[((3, 12), 22.562413434736985)]
sorted dist  [((3, 12), 22.562413434736985)]
Centeriods (3, 12) point (24, 3.75)
[((3, 12), 22.562413434736985)]
[((3, 12), 22.562413434736985)]
sorted dist  [((3, 12), 22.562413434736985)]
Centeriods (3, 12) point (12, 3.75)
[((3, 12), 12.20911544707478)]
[((3, 12), 12.20911544707478)]
sorted dist  [((3, 12), 12.20911544707478)]
Centeriods (3, 12) point (12, 0.85)
[((3, 12), 14.329078825939929)]
[((3, 12), 14.329078825939929)]
sorted dist  [((3, 12), 14.329078825939929)]
Centeriods (3, 12) point (24, 0.65)
[((3, 12), 23.870955154748206)]
[((3, 12), 23.870955154748206)]
sorted dist  [((3, 12), 23.870955154748206)]
Centeriods (3, 12) point (48, 0.85)
[((3, 12), 46.360786231469376)]
[((3, 12), 46.360786231469376)]
sorted dist  [((3, 12), 46.360786231469376)]
Centeriods (3, 12) point (24, 1.25)
[((3, 12), 23.59157688667716)]
[((3, 12), 23.59157688667716)]
sorted dist  [((3, 12), 23.59157688667716)]
Centeriods (3, 12) point (18, 2.95)
[((3, 12), 17.51863293753254)]
[((3, 12), 17.51863293753254)]
sorted dist  [((3, 12), 17.51863293753254)]
Centeriods (3, 12) point (24, 2.95)
[((3, 12), 22.867061464035995)]
[((3, 12), 22.867061464035995)]
sorted dist  [((3, 12), 22.867061464035995)]
Centeriods (3, 12) point (24, 1.95)
[((3, 12), 23.280947145681168)]
[((3, 12), 23.280947145681168)]
sorted dist  [((3, 12), 23.280947145681168)]
Centeriods (3, 12) point (24, 1.95)
[((3, 12), 23.280947145681168)]
```

```
[((3, 12), 23.280947145681168)]
sorted dist  [((3, 12), 23.280947145681168)]
Centeriods (3, 12) point (24, 1.95)
[((3, 12), 23.280947145681168)]
[((3, 12), 23.280947145681168)]
sorted dist  [((3, 12), 23.280947145681168)]
Centeriods (3, 12) point (20, 0.85)
[((3, 12), 20.330334478310974)]
[((3, 12), 20.330334478310974)]
sorted dist  [((3, 12), 20.330334478310974)]
Centeriods (3, 12) point (24, 1.65)
[((3, 12), 23.41201614556081)]
[((3, 12), 23.41201614556081)]
sorted dist  [((3, 12), 23.41201614556081)]
Centeriods (3, 12) point (24, 2.95)
[((3, 12), 22.867061464035995)]
[((3, 12), 22.867061464035995)]
sorted dist  [((3, 12), 22.867061464035995)]
Centeriods (3, 12) point (12, 3.75)
[((3, 12), 12.20911544707478)]
[((3, 12), 12.20911544707478)]
sorted dist  [((3, 12), 12.20911544707478)]
Centeriods (3, 12) point (24, 0.42)
[((3, 12), 23.981167611273644)]
[((3, 12), 23.981167611273644)]
sorted dist  [((3, 12), 23.981167611273644)]
Centeriods (3, 12) point (24, 0.42)
[((3, 12), 23.981167611273644)]
[((3, 12), 23.981167611273644)]
sorted dist  [((3, 12), 23.981167611273644)]
Centeriods (3, 12) point (36, 0.65)
[((3, 12), 34.897313650193766)]
[((3, 12), 34.897313650193766)]
sorted dist  [((3, 12), 34.897313650193766)]
Centeriods (3, 12) point (3, 18.0)
[((3, 12), 6.0)]
[((3, 12), 6.0)]
sorted dist  [((3, 12), 6.0)]
Centeriods (3, 12) point (80, 2.55)
[((3, 12), 77.57771909511132)]
[((3, 12), 77.57771909511132)]
sorted dist  [((3, 12), 77.57771909511132)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
```

```
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (6, 2.55)
[((3, 12), 9.914761721796443)]
[((3, 12), 9.914761721796443)]
sorted dist  [((3, 12), 9.914761721796443)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (8, 2.75)
[((3, 12), 10.514870422406545)]
[((3, 12), 10.514870422406545)]
sorted dist  [((3, 12), 10.514870422406545)]
Centeriods (3, 12) point (6, 4.95)
[((3, 12), 7.66175567347328)]
[((3, 12), 7.66175567347328)]
sorted dist  [((3, 12), 7.66175567347328)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (2, 4.95)
[((3, 12), 7.120568797504873)]
[((3, 12), 7.120568797504873)]
sorted dist  [((3, 12), 7.120568797504873)]
Centeriods (3, 12) point (4, 6.95)
[((3, 12), 5.148057886232438)]
[((3, 12), 5.148057886232438)]
sorted dist  [((3, 12), 5.148057886232438)]
Centeriods (3, 12) point (6, 2.1)
[((3, 12), 10.34456378974)]
[((3, 12), 10.34456378974)]
sorted dist  [((3, 12), 10.34456378974)]
Centeriods (3, 12) point (6, 2.55)
[((3, 12), 9.914761721796443)]
```

```
[((3, 12), 9.914761721796443)]
sorted dist  [((3, 12), 9.914761721796443)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (2, 7.65)
[((3, 12), 4.4634627812943615)]
[((3, 12), 4.4634627812943615)]
sorted dist  [((3, 12), 4.4634627812943615)]
Centeriods (3, 12) point (6, 4.25)
[((3, 12), 8.31038506929733)]
[((3, 12), 8.31038506929733)]
sorted dist  [((3, 12), 8.31038506929733)]
Centeriods (3, 12) point (32, 10.95)
[((3, 12), 29.019002394982497)]
[((3, 12), 29.019002394982497)]
sorted dist  [((3, 12), 29.019002394982497)]
Centeriods (3, 12) point (6, 2.55)
[((3, 12), 9.914761721796443)]
[((3, 12), 9.914761721796443)]
sorted dist  [((3, 12), 9.914761721796443)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (8, 2.75)
[((3, 12), 10.514870422406545)]
[((3, 12), 10.514870422406545)]
sorted dist  [((3, 12), 10.514870422406545)]
Centeriods (3, 12) point (6, 4.95)
[((3, 12), 7.66175567347328)]
[((3, 12), 7.66175567347328)]
sorted dist  [((3, 12), 7.66175567347328)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
```

```
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (6, 1.06)
[((3, 12), 11.343879406975375)]
[((3, 12), 11.343879406975375)]
sorted dist  [((3, 12), 11.343879406975375)]
Centeriods (3, 12) point (2, 4.95)
[((3, 12), 7.120568797504873)]
[((3, 12), 7.120568797504873)]
sorted dist  [((3, 12), 7.120568797504873)]
Centeriods (3, 12) point (4, 6.95)
[((3, 12), 5.148057886232438)]
[((3, 12), 5.148057886232438)]
sorted dist  [((3, 12), 5.148057886232438)]
Centeriods (3, 12) point (6, 2.1)
[((3, 12), 10.34456378974)]
[((3, 12), 10.34456378974)]
sorted dist  [((3, 12), 10.34456378974)]
Centeriods (3, 12) point (6, 2.55)
[((3, 12), 9.914761721796443)]
[((3, 12), 9.914761721796443)]
sorted dist  [((3, 12), 9.914761721796443)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (6, 3.39)
[((3, 12), 9.117680626124168)]
[((3, 12), 9.117680626124168)]
sorted dist  [((3, 12), 9.117680626124168)]
Centeriods (3, 12) point (2, 7.65)
[((3, 12), 4.4634627812943615)]
[((3, 12), 4.4634627812943615)]
sorted dist  [((3, 12), 4.4634627812943615)]
Centeriods (3, 12) point (6, 4.25)
[((3, 12), 8.31038506929733)]
[((3, 12), 8.31038506929733)]
sorted dist  [((3, 12), 8.31038506929733)]
Centeriods (3, 12) point (48, 3.45)
[((3, 12), 45.80504884835295)]
[((3, 12), 45.80504884835295)]
sorted dist  [((3, 12), 45.80504884835295)]
Centeriods (3, 12) point (64, 2.55)
[((3, 12), 61.727647776340866)]
[((3, 12), 61.727647776340866)]
sorted dist  [((3, 12), 61.727647776340866)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
```

```
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (6, 1.85)
[((3, 12), 10.584068215955527)]
[((3, 12), 10.584068215955527)]
sorted dist  [((3, 12), 10.584068215955527)]
Centeriods (3, 12) point (10, 1.95)
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Centeriods (3, 12) point (4, 3.75)
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Centeriods (3, 12) point (1, 1.25)
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[((3, 12), 9.45)]
[((3, 12), 9.45)]
sorted dist  [((3, 12), 9.45)]
Centeriods (3, 12) point (12, 0.42)
[((3, 12), 14.6661651429404)]
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[((3, 12), 14.6661651429404)]
sorted dist  [((3, 12), 14.6661651429404)]
Centeriods (3, 12) point (1, 2.1)
[((3, 12), 10.1)]
[((3, 12), 10.1)]
sorted dist  [((3, 12), 10.1)]
Centeriods (3, 12) point (2, 2.1)
[((3, 12), 9.950376877284599)]
[((3, 12), 9.950376877284599)]
sorted dist  [((3, 12), 9.950376877284599)]
Centeriods (3, 12) point (2, 2.1)
[((3, 12), 9.950376877284599)]
[((3, 12), 9.950376877284599)]
sorted dist  [((3, 12), 9.950376877284599)]
Centeriods (3, 12) point (2, 2.55)
[((3, 12), 9.50276275616728)]
[((3, 12), 9.50276275616728)]
sorted dist  [((3, 12), 9.50276275616728)]
Centeriods (3, 12) point (3, 2.55)
[((3, 12), 9.45)]
[((3, 12), 9.45)]
sorted dist  [((3, 12), 9.45)]
Centeriods (3, 12) point (2, 1.25)
[((3, 12), 10.796411440844592)]
[((3, 12), 10.796411440844592)]
sorted dist  [((3, 12), 10.796411440844592)]
Centeriods (3, 12) point (3, 2.95)
[((3, 12), 9.05)]
[((3, 12), 9.05)]
sorted dist  [((3, 12), 9.05)]
Centeriods (3, 12) point (2, 2.95)
[((3, 12), 9.105080999090564)]
[((3, 12), 9.105080999090564)]
sorted dist  [((3, 12), 9.105080999090564)]
Centeriods (3, 12) point (3, 0.85)
[((3, 12), 11.15)]
[((3, 12), 11.15)]
sorted dist  [((3, 12), 11.15)]
Centeriods (3, 12) point (1, 1.25)
[((3, 12), 10.93446386431452)]
[((3, 12), 10.93446386431452)]
sorted dist  [((3, 12), 10.93446386431452)]
Centeriods (3, 12) point (1, 1.65)
[((3, 12), 10.54146574248572)]
[((3, 12), 10.54146574248572)]
sorted dist  [((3, 12), 10.54146574248572)]
Centeriods (3, 12) point (1, 1.25)
[((3, 12), 10.93446386431452)]
```

```
[((3, 12), 10.93446386431452)]
sorted dist  [((3, 12), 10.93446386431452)]
Centeriods (3, 12) point (1, 1.25)
[((3, 12), 10.93446386431452)]
[((3, 12), 10.93446386431452)]
sorted dist  [((3, 12), 10.93446386431452)]
Centeriods (3, 12) point (1, 2.55)
[((3, 12), 9.659321922371154)]
[((3, 12), 9.659321922371154)]
sorted dist  [((3, 12), 9.659321922371154)]
Centeriods (3, 12) point (2, 1.25)
[((3, 12), 10.796411440844592)]
[((3, 12), 10.796411440844592)]
sorted dist  [((3, 12), 10.796411440844592)]
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