February 4, 2021

1 KNN: K-nearest neighbor

In this case we work with ***irregular data***, meaning that the dataset was not previously prepared for as in a nice csv file with no missing values and no wrong values.

```
[1]: import pandas as pd
     import numpy as np
     import sklearn
     from sklearn import linear_model, preprocessing
     from sklearn.utils import shuffle
     from sklearn.neighbors import KNeighborsClassifier
     import os
```

1.1 Read the data

```
[2]: dir_here = os.path.abspath("")
     dir_base = os.path.dirname(dir_here)
     dir_data = os.path.join(dir_base, "data")
     path_data_csv = os.path.join(dir_data, "car.data")
     print(path_data_csv)
```

/home/dancab/git/TWT-ML-Tutorial/data/car.data

```
[3]: names = ["buying", "maint", "door", "persons", "lug_boot", "safety", "class"]
     data = pd.read_csv(path_data_csv, header=None, names=names)
     print(data.head())
```

	buying	maint	door	persons	lug_boot	safety	class
0	vhigh	vhigh	2	2	small	low	unacc
1	vhigh	vhigh	2	2	small	med	unacc
2	vhigh	vhigh	2	2	small	high	unacc
3	vhigh	vhigh	2	2	med	low	unacc
4	vhigh	vhigh	2	2	med	med	unacc

1.2 Normalize the data

The dataset contains fields that are non-numerical.
For example: 'safety' can be 'low', 'med', 'high'.

To process this data it is better to previously convert it (*preprocess* it) to numerical values. For instance, 'low'=0, 'med'=1, 'high'=2.

To do that, sklearn offers the module 'preprocessing' that we already imported. Another alternative would be to do it ourselves, which wouldn't be that hard either.

```python
[4]: # Create a LabelEncoder object
     le = preprocessing.LabelEncoder()
     # It takes lists as inputs instead of pd.Series or np.arrays so:
     buying = le.fit_transform(list(data["buying"]))
     maint = le.fit_transform(list(data["maint"]))
     door = le.fit_transform(list(data["door"]))
     persons = le.fit_transform(list(data["persons"]))
     lug_boot = le.fit_transform(list(data["lug_boot"]))
     safety = le.fit_transform(list(data["safety"]))
     car_class = le.fit_transform(list(data["class"]))
     # Create new dataframe to visualize better this transformation
     df_le = pd.DataFrame(
         {
             'buying': buying,
             'maint': maint,
             'door': door,
             'persons': persons,
             'lug_boot': lug_boot,
             'safety': safety,
             'class': car_class
         }
     )
     print(df_le.head())
```

```
   buying  maint  door  persons  lug_boot  safety  class
0       3      3     0        0         2       1      2
1       3      3     0        0         2       2      2
2       3      3     0        0         2       0      2
3       3      3     0        0         1       1      2
4       3      3     0        0         1       2      2
```

It converted the values to numeric categories.
It seems that the order is alphabetical. That's why in the 'safety' field, 'low'=1, 'med'=2, but 'high'=0.

1.2.1 Split data between train and test batches

```python
[5]: # Prepare lists of x and y
     x = list(zip(buying, maint, door, persons, lug_boot, safety))
     y = list(car_class)
     # Split
     x_train, x_test, y_train, y_test = sklearn.model_selection.train_test_split(x,␣
       ↪y, test_size=0.1)
```

```
# Check it out
n = 30 if len(x_train)>30 else len(x_train)
for k in range(n):
    x_str = " ; ".join(f"{val:2d}" for val in x_train[k])
    print(x_str + "  |  " + f"{y_train[k]:2d}")
```

```
 1 ;  0 ;  1 ;  0 ;  2 ;  1 |   2
 0 ;  1 ;  3 ;  2 ;  1 ;  0 |   0
 3 ;  1 ;  3 ;  1 ;  0 ;  2 |   0
 0 ;  3 ;  2 ;  2 ;  2 ;  1 |   2
 1 ;  0 ;  0 ;  2 ;  1 ;  2 |   0
 3 ;  2 ;  3 ;  2 ;  2 ;  2 |   2
 3 ;  1 ;  1 ;  2 ;  0 ;  0 |   0
 0 ;  0 ;  0 ;  1 ;  2 ;  0 |   0
 1 ;  3 ;  1 ;  2 ;  1 ;  2 |   0
 0 ;  0 ;  2 ;  1 ;  2 ;  2 |   2
 1 ;  3 ;  3 ;  0 ;  0 ;  1 |   2
 1 ;  3 ;  1 ;  2 ;  2 ;  2 |   2
 0 ;  1 ;  3 ;  2 ;  0 ;  2 |   0
 0 ;  2 ;  3 ;  2 ;  2 ;  1 |   2
 3 ;  3 ;  1 ;  0 ;  2 ;  2 |   2
 3 ;  0 ;  3 ;  1 ;  1 ;  0 |   2
 1 ;  1 ;  0 ;  0 ;  0 ;  1 |   2
 0 ;  3 ;  1 ;  2 ;  1 ;  0 |   2
 1 ;  1 ;  2 ;  1 ;  0 ;  2 |   1
 1 ;  0 ;  2 ;  0 ;  2 ;  0 |   2
 2 ;  1 ;  0 ;  1 ;  0 ;  2 |   1
 1 ;  0 ;  1 ;  1 ;  0 ;  2 |   0
 0 ;  3 ;  0 ;  1 ;  2 ;  0 |   2
 1 ;  0 ;  0 ;  2 ;  1 ;  1 |   2
 1 ;  1 ;  2 ;  1 ;  1 ;  2 |   1
 2 ;  3 ;  1 ;  2 ;  2 ;  2 |   2
 0 ;  0 ;  1 ;  0 ;  1 ;  0 |   2
 3 ;  3 ;  0 ;  0 ;  0 ;  2 |   2
 1 ;  1 ;  2 ;  0 ;  1 ;  1 |   2
 3 ;  1 ;  1 ;  1 ;  2 ;  2 |   2
```

1.3   Create the KNN Model

```
[6]: model = KNeighborsClassifier(n_neighbors=5)
```

n_neighbors is the k number of nearest neighbors to look.

It is a **hyperparameter**:

In machine learning, a hyperparameter is a parameter whose value is used to control the learning process.
By contrast, the values of other parameters (typically node weights) are derived via training.
Source: Wikipedia's entry for hyperparameter

In this case we set it as 5 but we should play with it to see the differences in results.

1.3.1 Fit the model

```
[7]: # Let's do a single fit and check the accuracy
     model.fit(x_train, y_train)
     acc = model.score(x_test, y_test)
     print(acc)
```

0.8959537572254336

```
[8]: # Let's see with a changed n_neighbors
     model = KNeighborsClassifier(n_neighbors=7)
     model.fit(x_train, y_train)
     acc = model.score(x_test, y_test)
     print(acc)
```

0.9132947976878613

```
[9]: # Let's see with a changed n_neighbors
     model = KNeighborsClassifier(n_neighbors=9)
     model.fit(x_train, y_train)
     acc = model.score(x_test, y_test)
     print(acc)
```

0.9075144508670521

It seems 7 was the best option, let's run it again

```
[10]: # Let's see with a changed n_neighbors
      model = KNeighborsClassifier(n_neighbors=7)
      model.fit(x_train, y_train)
      acc = model.score(x_test, y_test)
      print(acc)
```

0.9132947976878613

1.3.2 Predict

```
[11]: predicted = model.predict(x_test)
      names = ["unacc", "acc", "good", "vgood"]
      # Tim uses this names in this order, I'm not so sure about the order, so I␣
      ↪don't use them later
      for k in range(len(predicted)):
          print("Predicted: ", predicted[k], "Data: ", x_test[k], "Actual: ",␣
      ↪y_test[k])
```

```
Predicted:  2 Data:  (2, 2, 0, 2, 2, 1) Actual:  2
Predicted:  2 Data:  (1, 0, 0, 0, 1, 0) Actual:  2
```

```
Predicted:  2 Data:  (3, 0, 3, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 2, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (1, 0, 1, 0, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 2, 0, 1, 2, 1) Actual:  2
Predicted:  0 Data:  (1, 3, 2, 2, 2, 0) Actual:  0
Predicted:  2 Data:  (0, 1, 2, 2, 1, 1) Actual:  2
Predicted:  0 Data:  (2, 3, 1, 2, 1, 0) Actual:  0
Predicted:  1 Data:  (1, 1, 3, 2, 2, 0) Actual:  1
Predicted:  0 Data:  (2, 1, 1, 1, 2, 2) Actual:  0
Predicted:  2 Data:  (2, 3, 0, 1, 2, 0) Actual:  0
Predicted:  2 Data:  (1, 3, 2, 0, 2, 1) Actual:  2
Predicted:  2 Data:  (2, 1, 1, 0, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 3, 0, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (2, 2, 1, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (3, 3, 0, 0, 1, 0) Actual:  2
Predicted:  2 Data:  (2, 1, 1, 2, 2, 1) Actual:  2
Predicted:  2 Data:  (2, 0, 3, 0, 2, 1) Actual:  2
Predicted:  0 Data:  (3, 2, 2, 2, 0, 0) Actual:  0
Predicted:  2 Data:  (2, 0, 2, 2, 1, 1) Actual:  2
Predicted:  2 Data:  (3, 3, 3, 2, 1, 0) Actual:  2
Predicted:  2 Data:  (0, 3, 2, 0, 1, 1) Actual:  2
Predicted:  0 Data:  (2, 2, 2, 1, 2, 0) Actual:  0
Predicted:  0 Data:  (1, 0, 3, 1, 2, 0) Actual:  0
Predicted:  2 Data:  (3, 3, 0, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (1, 1, 0, 2, 1, 1) Actual:  2
Predicted:  2 Data:  (0, 0, 0, 2, 2, 1) Actual:  2
Predicted:  2 Data:  (3, 2, 2, 0, 2, 2) Actual:  2
Predicted:  2 Data:  (1, 2, 0, 2, 2, 0) Actual:  2
Predicted:  2 Data:  (1, 3, 1, 1, 0, 2) Actual:  0
Predicted:  2 Data:  (2, 0, 0, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (0, 0, 1, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (0, 3, 1, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (2, 1, 2, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (2, 1, 3, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (2, 0, 0, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (2, 3, 2, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (0, 0, 3, 0, 1, 1) Actual:  2
Predicted:  0 Data:  (2, 1, 3, 1, 2, 0) Actual:  1
Predicted:  2 Data:  (0, 2, 0, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (1, 3, 3, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 2, 2, 0, 0) Actual:  2
Predicted:  0 Data:  (2, 0, 3, 1, 1, 0) Actual:  0
Predicted:  2 Data:  (1, 1, 2, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (1, 3, 1, 2, 2, 0) Actual:  0
Predicted:  0 Data:  (1, 0, 0, 2, 0, 0) Actual:  3
Predicted:  2 Data:  (3, 0, 1, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (2, 3, 1, 2, 2, 0) Actual:  0
Predicted:  2 Data:  (3, 2, 3, 0, 1, 0) Actual:  2
```

```
Predicted:  2 Data:  (0, 3, 1, 0, 2, 0) Actual:  2
Predicted:  2 Data:  (1, 2, 0, 2, 1, 2) Actual:  0
Predicted:  0 Data:  (0, 0, 2, 2, 2, 0) Actual:  0
Predicted:  2 Data:  (1, 2, 0, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (1, 1, 0, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (3, 0, 2, 0, 1, 2) Actual:  2
Predicted:  1 Data:  (1, 2, 3, 1, 1, 2) Actual:  1
Predicted:  2 Data:  (0, 3, 1, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 1, 2, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (2, 2, 1, 1, 0, 1) Actual:  2
Predicted:  0 Data:  (3, 1, 1, 2, 1, 0) Actual:  0
Predicted:  0 Data:  (0, 1, 0, 2, 1, 0) Actual:  0
Predicted:  2 Data:  (0, 0, 3, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (1, 2, 2, 0, 2, 0) Actual:  2
Predicted:  2 Data:  (0, 0, 3, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (2, 3, 3, 0, 1, 2) Actual:  2
Predicted:  0 Data:  (0, 1, 3, 1, 2, 0) Actual:  0
Predicted:  2 Data:  (3, 0, 1, 1, 2, 1) Actual:  2
Predicted:  2 Data:  (0, 0, 3, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (0, 3, 0, 2, 1, 0) Actual:  2
Predicted:  2 Data:  (3, 1, 3, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 3, 2, 2, 0) Actual:  2
Predicted:  2 Data:  (1, 2, 2, 0, 0, 2) Actual:  2
Predicted:  0 Data:  (0, 1, 1, 2, 1, 0) Actual:  0
Predicted:  0 Data:  (0, 1, 3, 2, 1, 2) Actual:  0
Predicted:  0 Data:  (0, 0, 3, 2, 2, 0) Actual:  0
Predicted:  3 Data:  (2, 2, 1, 2, 0, 0) Actual:  3
Predicted:  0 Data:  (2, 1, 0, 2, 1, 0) Actual:  1
Predicted:  2 Data:  (2, 2, 2, 0, 0, 1) Actual:  2
Predicted:  2 Data:  (2, 3, 0, 2, 1, 1) Actual:  2
Predicted:  2 Data:  (1, 2, 0, 0, 0, 1) Actual:  2
Predicted:  2 Data:  (1, 1, 2, 0, 1, 0) Actual:  2
Predicted:  2 Data:  (2, 1, 1, 2, 1, 1) Actual:  2
Predicted:  2 Data:  (1, 3, 2, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (1, 3, 0, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (0, 2, 1, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (2, 3, 0, 1, 1, 2) Actual:  2
Predicted:  0 Data:  (3, 1, 1, 2, 0, 2) Actual:  0
Predicted:  0 Data:  (2, 0, 3, 1, 0, 2) Actual:  0
Predicted:  2 Data:  (1, 3, 2, 1, 2, 1) Actual:  2
Predicted:  2 Data:  (1, 1, 1, 0, 1, 0) Actual:  2
Predicted:  0 Data:  (0, 0, 2, 2, 0, 2) Actual:  0
Predicted:  2 Data:  (3, 3, 1, 1, 0, 1) Actual:  2
Predicted:  2 Data:  (3, 2, 2, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (0, 1, 0, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 2, 0, 1, 1, 1) Actual:  2
Predicted:  2 Data:  (2, 1, 1, 1, 2, 1) Actual:  2
Predicted:  2 Data:  (1, 2, 2, 0, 2, 2) Actual:  2
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Predicted:  2 Data:  (3, 0, 1, 2, 0, 2) Actual:  2
Predicted:  0 Data:  (2, 3, 3, 2, 1, 0) Actual:  0
Predicted:  2 Data:  (0, 0, 0, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 2, 1, 0, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 1, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (3, 0, 3, 2, 0, 2) Actual:  2
Predicted:  2 Data:  (3, 1, 0, 2, 0, 2) Actual:  0
Predicted:  1 Data:  (2, 1, 2, 1, 1, 0) Actual:  3
Predicted:  2 Data:  (3, 2, 3, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 0, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (0, 2, 3, 2, 1, 1) Actual:  2
Predicted:  0 Data:  (1, 0, 3, 1, 2, 2) Actual:  0
Predicted:  1 Data:  (1, 1, 0, 1, 1, 0) Actual:  1
Predicted:  2 Data:  (3, 0, 1, 1, 2, 2) Actual:  2
Predicted:  2 Data:  (3, 0, 1, 0, 2, 0) Actual:  2
Predicted:  2 Data:  (1, 3, 1, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (3, 2, 0, 2, 2, 0) Actual:  2
Predicted:  0 Data:  (2, 3, 3, 1, 2, 0) Actual:  0
Predicted:  2 Data:  (0, 0, 1, 1, 1, 2) Actual:  2
Predicted:  2 Data:  (2, 3, 1, 1, 0, 2) Actual:  0
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Predicted:  2 Data:  (3, 2, 0, 0, 2, 1) Actual:  2
Predicted:  2 Data:  (3, 2, 1, 2, 0, 1) Actual:  2
Predicted:  3 Data:  (2, 1, 2, 2, 1, 0) Actual:  3
Predicted:  0 Data:  (2, 3, 2, 2, 0, 2) Actual:  0
Predicted:  2 Data:  (2, 3, 1, 1, 1, 1) Actual:  2
Predicted:  2 Data:  (1, 2, 2, 1, 0, 1) Actual:  2
Predicted:  2 Data:  (1, 2, 1, 2, 1, 1) Actual:  2
Predicted:  0 Data:  (2, 0, 3, 2, 1, 0) Actual:  0
Predicted:  2 Data:  (3, 2, 0, 1, 1, 2) Actual:  2
Predicted:  2 Data:  (3, 1, 2, 2, 2, 1) Actual:  2
Predicted:  2 Data:  (2, 0, 3, 0, 2, 0) Actual:  2
Predicted:  0 Data:  (3, 1, 2, 2, 1, 0) Actual:  0
Predicted:  2 Data:  (1, 2, 0, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (2, 1, 0, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (0, 2, 3, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (1, 3, 1, 0, 0, 1) Actual:  2
Predicted:  2 Data:  (2, 1, 0, 0, 2, 1) Actual:  2
Predicted:  0 Data:  (3, 2, 0, 1, 0, 0) Actual:  0
Predicted:  2 Data:  (3, 3, 0, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (2, 3, 0, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (0, 3, 3, 2, 2, 0) Actual:  2
```

```
Predicted:  2 Data:  (2, 1, 0, 0, 1, 2) Actual:  2
Predicted:  2 Data:  (3, 1, 1, 2, 0, 1) Actual:  2
Predicted:  2 Data:  (2, 3, 3, 1, 2, 1) Actual:  2
Predicted:  2 Data:  (3, 0, 3, 2, 0, 1) Actual:  2
Predicted:  1 Data:  (1, 1, 2, 2, 2, 0) Actual:  1
Predicted:  2 Data:  (0, 1, 0, 0, 1, 1) Actual:  2
Predicted:  2 Data:  (2, 3, 3, 0, 2, 0) Actual:  2
Predicted:  0 Data:  (1, 3, 3, 2, 2, 0) Actual:  0
Predicted:  2 Data:  (1, 1, 2, 1, 2, 1) Actual:  2
Predicted:  2 Data:  (2, 0, 2, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (3, 1, 0, 1, 1, 2) Actual:  2
Predicted:  2 Data:  (1, 3, 0, 0, 2, 1) Actual:  2
Predicted:  2 Data:  (0, 2, 0, 0, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 2, 1, 1, 2, 2) Actual:  0
Predicted:  2 Data:  (3, 2, 1, 2, 1, 2) Actual:  0
Predicted:  2 Data:  (1, 3, 3, 0, 0, 2) Actual:  2
Predicted:  2 Data:  (1, 3, 2, 2, 2, 2) Actual:  2
Predicted:  2 Data:  (2, 1, 0, 2, 1, 2) Actual:  0
Predicted:  0 Data:  (2, 3, 2, 2, 2, 0) Actual:  0
Predicted:  0 Data:  (2, 3, 1, 2, 0, 0) Actual:  0
Predicted:  2 Data:  (1, 2, 3, 0, 0, 0) Actual:  2
Predicted:  2 Data:  (2, 2, 3, 1, 1, 1) Actual:  2
Predicted:  2 Data:  (1, 0, 3, 1, 1, 1) Actual:  2
Predicted:  2 Data:  (2, 1, 3, 2, 1, 1) Actual:  2
Predicted:  2 Data:  (3, 1, 3, 1, 0, 1) Actual:  2
Predicted:  2 Data:  (2, 2, 1, 0, 1, 0) Actual:  2
Predicted:  1 Data:  (2, 1, 2, 2, 1, 2) Actual:  1
```

1.3.3 Print k-nearest neighbors of each point

```
[12]: for k in range(len(predicted)):
          n = model.kneighbors([x_test[k]], 7, True)
          print("---")
          print(f"{k:03d}")
          print("Distances: ", n[0].tolist())
          print("Indexes: ", n[1].tolist())
```

```
---
000
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[141, 207, 1142, 916, 528, 1279, 857]]
---
001
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[488, 216, 1315, 894, 597, 714, 320]]
---
002
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
```

```
Indexes:  [[1087, 1052, 297, 1222, 39, 928, 135]]
---
003
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[39, 630, 1187, 1186, 108, 1087, 72]]
---
004
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1521, 1102, 0, 694, 198, 1139, 678]]
---
005
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1538, 1277, 945, 293, 1381, 1096, 1051]]
---
006
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[842, 229, 1133, 1165, 1280, 1074, 690]]
---
007
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[758, 577, 1232, 830, 326, 741, 109]]
---
008
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[924, 690, 1226, 1069, 988, 1213, 1276]]
---
009
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[970, 1353, 1045, 1479, 1318, 1466, 847]]
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010
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[29, 880, 107, 444, 466, 1499, 825]]
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011
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1096, 580, 1041, 1272, 983, 1051, 871]]
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012
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1461, 1410, 227, 666, 397, 739, 172]]
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013
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[888, 845, 707, 1373, 279, 1508, 160]]
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014
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
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Indexes:  [[325, 27, 817, 1516, 1317, 380, 354]]
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015
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[868, 414, 567, 83, 703, 1467, 1057]]
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016
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1447, 1265, 225, 1015, 1258, 763, 500]]
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017
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1224, 916, 692, 434, 1363, 107, 857]]
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018
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1220, 1551, 1039, 562, 747, 1415, 554]]
---
019
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[223, 479, 1300, 590, 1178, 1205, 404]]
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020
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[949, 1513, 1404, 87, 156, 352, 1380]]
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021
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1120, 245, 1457, 1368, 390, 461, 37]]
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022
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[200, 227, 608, 515, 1270, 271, 1263]]
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023
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[490, 487, 1127, 1175, 676, 270, 1047]]
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024
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[755, 1503, 970, 1318, 132, 323, 197]]
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025
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[343, 288, 1032, 1554, 1540, 931, 25]]
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026
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:   [[261, 776, 463, 219, 23, 398, 1267]]
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027
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[1338, 416, 57, 59, 1434, 439, 926]]
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028
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[1007, 1449, 1009, 1458, 1421, 415, 1366]]
---
029
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[779, 607, 715, 685, 319, 1074, 1046]]
---
030
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[384, 1198, 1106, 106, 422, 646, 659]]
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031
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:   [[1008, 541, 969, 854, 1553, 488, 260]]
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032
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[59, 254, 1338, 1541, 874, 1253, 1483]]
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033
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[1340, 1115, 1306, 30, 468, 1419, 271]]
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034
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[1293, 363, 410, 302, 621, 382, 1303]]
---
035
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[1022, 944, 562, 1527, 1004, 364, 424]]
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036
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[557, 454, 895, 243, 1553, 1094, 539]]
---
037
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:   [[338, 1040, 1487, 588, 276, 342, 985]]
---
038
Distances:   [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1450, 959, 368, 942, 757, 233, 936]]
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039
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1391, 585, 676, 657, 1371, 1353, 95]]
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040
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[623, 1427, 491, 571, 746, 212, 1063]]
---
041
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[778, 965, 1319, 205, 124, 238, 10]]
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042
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[286, 1341, 999, 404, 835, 1176, 1207]]
---
043
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1333, 15, 180, 1371, 635, 657, 918]]
---
044
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[492, 1005, 1388, 664, 973, 326, 741]]
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045
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[640, 685, 737, 690, 609, 1074, 806]]
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046
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[116, 432, 542, 1246, 1314, 447, 958]]
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047
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1050, 583, 642, 541, 129, 854, 1389]]
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048
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[1113, 589, 1215, 983, 1272, 528, 1047]]
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049
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[188, 1401, 259, 84, 139, 1256, 1412]]
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050
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[189, 273, 383, 1112, 1352, 486, 993]]
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051
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[785, 1547, 637, 261, 381, 280, 308]]
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052
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1223, 472, 1323, 1535, 81, 595, 1448]]
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053
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[473, 1083, 725, 242, 262, 157, 489]]
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054
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[467, 392, 1315, 776, 1091, 894, 16]]
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055
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1342, 1122, 1438, 572, 72, 1187, 781]]
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056
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1304, 965, 706, 355, 1062, 1104, 238]]
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057
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[549, 955, 468, 417, 372, 1419, 402]]
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058
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[364, 1122, 1373, 662, 1110, 424, 160]]
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059
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1467, 102, 309, 677, 1518, 517, 347]]
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060
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[667, 118, 1320, 6, 1313, 1018, 250]]
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061
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[337, 155, 219, 780, 398, 317, 161]]
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062
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
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Indexes:  [[1450, 1079, 957, 757, 1055, 1407, 514]]
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063
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[90, 172, 961, 881, 1546, 743, 1410]]
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064
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1030, 815, 407, 1181, 716, 1455, 1506]]
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065
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1298, 1262, 1530, 1010, 75, 745, 848]]
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066
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[35, 1236, 970, 847, 132, 860, 1044]]
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067
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[865, 1433, 1376, 1107, 533, 457, 1431]]
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068
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[407, 815, 1316, 1080, 1409, 9, 368]]
---
069
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[63, 155, 766, 17, 748, 1250, 782]]
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070
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1329, 947, 1082, 981, 1193, 5, 1052]]
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071
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[644, 391, 570, 74, 297, 1124, 835]]
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072
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1174, 596, 339, 1076, 873, 50, 263]]
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073
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1437, 758, 65, 1089, 1238, 1092, 1400]]
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074
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1020, 1232, 12, 577, 582, 130, 411]]
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075
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[847, 132, 1318, 839, 1146, 409, 1316]]
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076
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[677, 400, 988, 1178, 309, 112, 97]]
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077
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[863, 1320, 653, 117, 756, 118, 885]]
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078
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[951, 310, 120, 363, 347, 1303, 868]]
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079
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[538, 1213, 141, 1276, 974, 925, 1279]]
---
080
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[392, 16, 530, 1185, 746, 1063, 1336]]
---
081
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[639, 771, 1257, 1153, 28, 1064, 247]]
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082
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[932, 1313, 1498, 352, 475, 118, 885]]
---
083
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1243, 477, 1384, 1296, 151, 179, 1147]]
---
084
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[381, 343, 11, 1536, 736, 249, 785]]
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085
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1357, 1211, 128, 464, 1115, 1263, 125]]
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086
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1360, 1282, 974, 633, 374, 925, 325]]
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087
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[1426, 791, 1078, 1504, 808, 829, 841]]
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088
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[60, 893, 767, 208, 506, 370, 32]]
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089
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[181, 1133, 1073, 842, 1085, 858, 687]]
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090
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[311, 527, 1315, 446, 597, 115, 480]]
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091
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1387, 303, 772, 1217, 137, 695, 1301]]
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092
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[686, 230, 976, 1203, 1403, 750, 102]]
---
093
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[673, 188, 600, 415, 120, 139, 868]]
---
094
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[105, 1539, 1472, 1090, 1378, 1216, 1413]]
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095
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1279, 513, 1360, 974, 567, 1518, 453]]
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096
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1431, 1260, 1508, 1538, 1255, 1433, 932]]
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097
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1492, 1206, 873, 1288, 1512, 1410, 99]]
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098
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
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Indexes:  [[331, 1240, 829, 828, 537, 1028, 1209]]
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099
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1173, 844, 1552, 1291, 1374, 1069, 886]]
---
100
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1221, 454, 38, 1427, 697, 1131, 373]]
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101
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[893, 1166, 1240, 1342, 591, 829, 72]]
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102
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1207, 1028, 975, 721, 1209, 286, 841]]
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103
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[1240, 1052, 433, 893, 370, 122, 1361]]
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104
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[551, 33, 419, 331, 849, 954, 176]]
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105
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[696, 635, 1321, 676, 1371, 1017, 123]]
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106
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[558, 154, 165, 795, 521, 88, 1048]]
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107
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[307, 482, 865, 611, 1043, 61, 992]]
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108
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[13, 96, 850, 218, 1154, 896, 1287]]
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109
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1070, 628, 1244, 1545, 66, 966, 755]]
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110
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1315, 398, 1355, 446, 780, 1056, 714]]
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111
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[516, 1499, 1252, 672, 29, 457, 707]]
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112
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[822, 578, 503, 813, 642, 1376, 457]]
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113
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[384, 985, 1163, 1307, 978, 422, 519]]
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114
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[204, 1059, 1469, 207, 405, 792, 528]]
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115
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1291, 1350, 1175, 1552, 490, 566, 265]]
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116
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[121, 113, 1278, 1483, 821, 1541, 520]]
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117
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[817, 1203, 102, 1229, 633, 843, 325]]
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118
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1454, 1525, 850, 744, 851, 56, 693]]
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119
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[924, 1024, 750, 1134, 1178, 1205, 684]]
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120
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[987, 137, 695, 759, 1239, 619, 1068]]
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121
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[8, 1384, 305, 1347, 609, 690, 724]]
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122
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1150, 315, 1029, 728, 1065, 879, 346]]
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123
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[384, 1406, 519, 852, 455, 547, 659]]
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124
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1525, 770, 1454, 401, 1370, 1037, 660]]
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125
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1488, 36, 1432, 1145, 1277, 838, 945]]
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126
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[750, 791, 526, 686, 399, 1178, 677]]
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127
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1067, 1348, 689, 1380, 458, 118, 512]]
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128
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1372, 1243, 722, 742, 1332, 264, 843]]
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129
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[633, 1490, 1226, 102, 1467, 703, 974]]
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130
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[561, 535, 1076, 560, 339, 544, 956]]
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131
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1465, 481, 1307, 1495, 952, 308, 1081]]
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132
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1067, 674, 1513, 74, 1124, 235, 1380]]
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133
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[114, 700, 1000, 158, 529, 1335, 1360]]
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134
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[40, 981, 389, 1082, 47, 692, 928]]
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135
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[134, 1098, 1333, 95, 657, 197, 1220]]
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136
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1505, 223, 47, 1460, 404, 389, 835]]
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137
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[392, 1091, 349, 212, 217, 1063, 1480]]
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138
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[54, 242, 1230, 1083, 563, 799, 824]]
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139
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[851, 1020, 13, 1189, 298, 836, 850]]
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140
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[52, 1336, 1169, 530, 646, 182, 422]]
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141
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[888, 1538, 1241, 1488, 1508, 525, 565]]
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142
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[719, 869, 684, 1135, 1196, 1436, 986]]
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143
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1248, 750, 1225, 1134, 399, 538, 1403]]
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144
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[807, 474, 1444, 1502, 354, 349, 703]]
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145
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[1275, 599, 427, 1280, 1155, 732, 1143]]
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146
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[565, 629, 160, 539, 895, 888, 1118]]
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147
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[1313, 475, 6, 841, 551, 1514, 1111]]
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148
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[265, 201, 658, 393, 1385, 832, 1105]]
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149
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[236, 798, 286, 122, 1176, 1542, 591]]
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150
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[663, 367, 606, 229, 1323, 827, 1223]]
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151
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1299, 1537, 1117, 209, 797, 1416, 804]]
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152
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[832, 1520, 594, 574, 186, 69, 1497]]
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153
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[844, 1552, 566, 733, 1479, 1133, 842]]
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154
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[284, 420, 827, 559, 765, 428, 870]]
---
155
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[996, 583, 1162, 244, 934, 997, 541]]
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156
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1043, 419, 849, 1049, 307, 629, 258]]
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157
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[994, 923, 927, 1461, 80, 485, 168]]
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158
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[240, 1216, 212, 1119, 451, 224, 1480]]
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159
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[293, 1184, 334, 1199, 845, 1054, 1381]]
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160
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[526, 1377, 114, 791, 938, 426, 1426]]
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161
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[10, 376, 660, 1174, 1370, 1298, 665]]
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162
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[712, 991, 1285, 1073, 1133, 318, 11]]
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163
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[478, 419, 1498, 1462, 33, 885, 1118]]
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164
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951]]
Indexes:  [[371, 490, 1069, 1411, 1552, 634, 1113]]
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165
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.4142135623730951, 1.4142135623730951]]
Indexes:  [[624, 978, 586, 1487, 985, 1276, 1358]]
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166
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[140, 679, 221, 1151, 1367, 729, 810]]
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167
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[671, 658, 1108, 1531, 265, 944, 174]]
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168
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[66, 942, 323, 670, 233, 755, 1441]]
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169
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1266, 1513, 1067, 960, 1109, 944, 458]]
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170
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
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Indexes:  [[1522, 1071, 798, 228, 2, 122, 183]]
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171
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[760, 1023, 1471, 103, 290, 171, 336]]
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172
Distances:  [[1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0]]
Indexes:  [[1109, 87, 458, 579, 1498, 452, 1110]]
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