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```
#include <bits/stdc++.h>
using namespace std;

double euclidean_distance( double data[], double testdata[], int
n_features) {
    double distance = 0;
    for (int i = 0; i < n_features; i++) {
        distance += pow(data[i] - testdata[i], 2);
    }
    return sqrt(distance);
}
double DistanceList[54];
const int n_features = 8;
string mbti_type_data[54]
={"INTP","ISTP","ENTP","ISTJ","ENFP","ISTJ","INTJ","ESFJ","INFJ","INFJ"
,"ENTP","INTP","INFP","ESTJ","ESTJ",
"INTP","INFP","ENTP","ESFP","ESTJ","ISFJ","ISTP","ENTP","ENTP","INTP","
INTP","ISFJ","ISTJ","ESTJ","ESFJ","INTP","INTJ","INTP","ENFP","ISTP","I
NTP",
"ENTP","ISTJ","INTP","INTP","ENTP","ESTJ","ESTJ","ESTJ","INTP","ESTJ","
INFP","ISTJ","ESTP","ESFJ","INFP","ENTP","INTP","INFJ"
    };
string Name_data[54]={"Warin Wattanapornprom","Kornkanok
Welagert","Kunakron Tana","Chinnapt Sukthong","Chinavat Nachaithong",
"Teekamon Chaiwongwutikul","Dollatham Charoethammkic","Thiyada
Kittiwithitkun","Thidarat Sitthidech",
"Phumiphat Santithawornying","Manotham Damnoen","Wachirawit
Intapan","Warit Teerapong","Sasima Phanta",
"Artima Rojanagamonson","Koraphan Manitha","Ganyawee Sanghom","Kimhan
Jongjaidee","Chaithawat Saklang",
"Nattanischa Aumpornchairuch","Thanapong Simmanee","Thidarut
Deeramies","Panachai Suvimolopas","Pattanapol Saelim",
"Pichayut Sombat","Poomthai Promkote","Lalhada Suttiprapha","Santijit
Kamnak","Kantinan Kuikeaw","Chothanin Thitisrirat",
"Warin Wattanapornprom","Yanisa Mungkarotai","Jessada Pranee","Suphanut
Chanroong","Keerataphan Malai","Thanachot Wongyai",
"Pawinnarut Pornpanarat","Phirada Chemmanmud","Phattawee
Witthayapanyanont","Sathapana Tinop","Nuttasit Tannitipaisal","Nut
Somwang",
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"Pattarachanon Uraiwichaikul","Krantharat Ratchart","Pasin
Laopooti","Patchnida Hemwannanukul","Nakamon Yongpaisarn","Atchima
Nateepradap",
"Natthapon Tanateeraanan","Naphatchanun Suecey","Narutchai
Mauensaen","Natchapon Ponlaem","Phacharaphon Aiamphan","Sarita
Tongsawat"
};
double train_data[54][n_features] = {
    {32,32,27,36,29,31,28,23},
{28.4,29.4,29,34,27,24,23,21},
{30,24,25,27,23,28,26,17},
{21,25.6,29,30,28,29,28,30},
{35.6,37.8,27,28,28,29,36,35},
{23.4,26,27,30,28,31,26,21},
{37,47.8,43,47,47,45,37,43},
{34,26.6,26,29,28,34,33,32},
{29,31.2,26,27,17,32,33,26},
{26.2,28.6,21,25,30,31,32,20},
{35.4,29.4,26,28,28,19,29,27},
{29,25,21,23,32,36,14,19},
{35.8,28.4,28,32,18,32,31,35},
{20.4,22.4,32,32,24,28,25,16},
{34.8,28,35,32,26,32,28,17},
{22.4,31.4,33,34,33,35,25,23},
{34.4,36.8,24,32,28,35,32,34},
{38.2,32.2,35,34,17,28,28,18},
{24.8,24.6,29,26,29,28,29,29},
{29.2,23.8,28,30,22,31,32,21},
{23.4,30.8,35,41,31,36,39,29},
{31.6,36.4,24,32,32,30,24,20},
{34.2,24.6,31,35,33,25,32,25},
{41.8,37.8,28,21,34,34,33,23},
{32.2,25.2,29,27,30,31,25,26},
{39.6,46.8,33,36,32,36,30,30},
{27.8,23.4,21,27,24,35,26,22},
{22.4,20.6,26,26,26,30,22,25},
{13.8,16,33,31,35,32,23,16},
{29.8,28,24,26,29,32,36,18},
{32,32,27,36,29,31,28,23},
{23,26.6,28,25,17,29,29,31},
{27.8,24.2,32,29,18,20,13,31},
{34.6,32,25,29,23,24,29,26},
{15.6,28.2,21,31,19,28,18,23},
```

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{24.8,19.2,25,30,22,28,19,25},
{47.4,31.2,36,32,36,37,29,31},
{23.6,22.2,28,35,27,40,23,22},
{37.2,23.6,36,39,34,33,31,16},
{23.2,30.6,30,36,19,21,4,28},
{33.6,34.4,24,24,31,35,32,25},
{19.6,19.2,25,32,36,30,20,17},
{35.6,28.4,36,38,36,28,29,30},
{26.6,21,27,27,25,26,22,19},
{32.8,31,28,37,29,38,25,29},
{29.8,23.4,30,26,27,30,29,29},
{28,24,31,31,29,37,28,28},
{17.6,22.2,28,25,20,35,27,18},
{24.6,22,32,32,36,38,35,27},
{23.4,26,31,33,24,27,31,21},
{33.2,27,32,28,33,32,39,40},
{33.6,32,34,31,31,37,36,29},
{36.4,36.4,34,32,31,31,37,29},
{33,33.6,25,29,25,28,35,34}
    };
int main() {
     double test_data[n_features] = {31,    33, 30, 38, 31, 34, 31};

    // create a vector of pairs to store distance, name, and MBTI type
    vector<pair<double, pair<string, string>>> data_with_distances;

    // calculate distances and store in vector
    for (int i = 0; i < 54; i++) {
        double ptr_train[n_features];
        for (int j = 0; j < n_features; j++) {
            ptr_train[j] = train_data[i][j];
        }
        double distance = euclidean_distance(ptr_train, test_data,
n_features);
        data_with_distances.push_back({distance, {Name_data[i],
mbti_type_data[i]}});
    }

    // sort the vector by distance
    sort(data_with_distances.begin(), data_with_distances.end());

    // print the data with distances
```

```
    cout << setw(30) << "NAME" <<  setw(25) << "TYPE" << setw(20) <<
"DISTANCE" << endl;
    unordered_map<string, int> class_votes;
    int k = 13;
    for (int i = 0; i < k; i++) {
        string mbti_type = data_with_distances[i].second.second;
        if (class_votes.find(mbti_type) == class_votes.end()) {
            class_votes[mbti_type] = 1;
        } else {
            class_votes[mbti_type]++;
        }
        cout << "Neighbor " << i+1 << ": "  << setw(30) <<
data_with_distances[i].second.first
             << setw(20) << data_with_distances[i].second.second
             << setw(20) << data_with_distances[i].first << endl;;
    }
    // find the majority class and output the predicted MBTI type
    string predicted_type = "";
    int max_votes = 0;
    for (auto const& pair : class_votes) {
        if (pair.second > max_votes) {
            max_votes = pair.second;
            predicted_type = pair.first;
        }
    }
    cout << "Predicted MBTI type: " << predicted_type << endl;

    return 0;
}
```

OUTPUT

```
PS D:\C Projet\KNN\output> & .\'KNN.exe'
                      NAME                      TYPE          DISTANCE
Neighbor 1:          Artima Rojanagamonson              ESTJ          20.6746
Neighbor 2:    Phattawee Witthayapanyanont              INTP          20.7316
Neighbor 3:             Thidarut Deeramies              ISTP          23.4504
Neighbor 4:          Chothanin Thitisrirat              ESFJ          23.7369
Neighbor 5:          Warin Wattanapornprom              INTP          23.7908
Neighbor 6:          Warin Wattanapornprom              INTP          23.7908
Neighbor 7:                  Sasima Phanta              ESTJ          25.3322
Neighbor 8:                  Kunakron Tana              ENTP          25.3377
Neighbor 9:             Kornkanok Welagert              ISTP          25.6461
Neighbor 10:              Kimhan Jongjaidee               ENTP          25.6609
Neighbor 11:       Teekamon Chaiwongwutikul               ISTJ          25.7635
Neighbor 12:               Koraphan Manitha               INTP          25.9137
Neighbor 13:            Naphatchanun Suecey               ESFJ          25.9183
Predicted MBTI type: INTP
```