Machine Learning

Assignment 4: KNN Classifier

1.

Height	Weight	Size
1.6	51	S
1.7	62	L
1.85	69	L
1.42	64	S
1.3	65	S
2.1	56	L
1.4	58	S
1.65	57	L
1.9	55	L
1.5	60	?

Code:

```java
import java.util.Scanner;

1 usage
public class KNN {
    5 usages
    private static final double[][] data = {
            {1.6, 51, 83},
            {1.7, 62, 76},
            {1.85, 69, 76},
            {1.42, 64, 83},
            {1.3, 65, 83},
            {2.1, 56, 76},
            {1.4, 58, 83},
            {1.65, 57, 76},
            {1.9, 55, 76}
    };
    1 usage
    private static double ed(double[] instance1, double[] instance2) {
        double dist = 0;
        for (int i = 0; i < instance1.length; i++) {
            dist += Math.pow(instance1[i] - instance2[i], 2);
        }
        return Math.sqrt(dist);
    }
    1 usage
    private static String predict(double height, double weight) {
        double[] inst = {height, weight};
        double[] dist = new double[data.length];

        for (int i = 0; i < data.length; i++) {
            double[] train = {data[i][0], data[i][1]};
            dist[i] = ed(inst, train);
        }
```

```java
        int k = 7;
        String[] nearestNeighbors = new String[k];
        for (int i = 0; i < k; i++) {
            int index = -1;
            double minDistance = Double.MAX_VALUE;
            for (int j = 0; j < dist.length; j++) {
                if (dist[j] < minDistance) {
                    minDistance = dist[j];
                    index = j;
                }
            }
            char letter = (char)(data[index][2]);
            nearestNeighbors[i] = Character.toString(letter);;
            dist[index] = Double.MAX_VALUE;
        }
        int lCount = 0;
        int sCount = 0;
        for (int i = 0; i < nearestNeighbors.length; i++) {
            if (nearestNeighbors[i].equals("L")) {
                lCount++;
            } else if (nearestNeighbors[i].equals("S")) {
                sCount++;
            }
        }
        if (lCount > sCount)
            return "Large";
        else
            return "Small";
    }
}

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter height: ");
    double height = sc.nextDouble();
    System.out.print("Enter weight: ");
    double weight = sc.nextDouble();
    System.out.println("The shirt size is: " + KNN.predict(height, weight));
}
}
```

Output:

```
"C:\Program Files\Java\jdk-19\bin'
Enter height: 1.5
Enter weight: 60
The shirt size is: Large
```

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