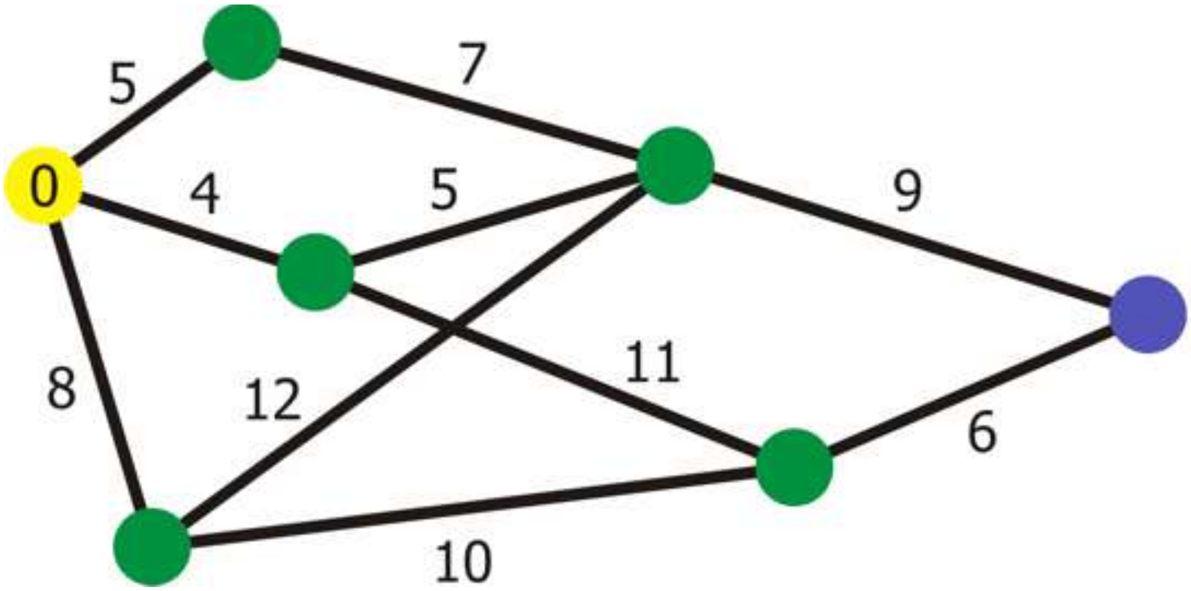
Visualization of the Algorithm :

Numbers in the circles represent the current minimum distance to reach that location while the numbers in the edges show the distance between two circles.
In this visualization, source is chosen to be the one with zero min distance and the destination is chosen as the purple one.
To view as GIF:
https://miro.medium.com/v2/resize:fit:1100/format:webp/1*ZRxGin6iTpHuME24X7oWzg.gif

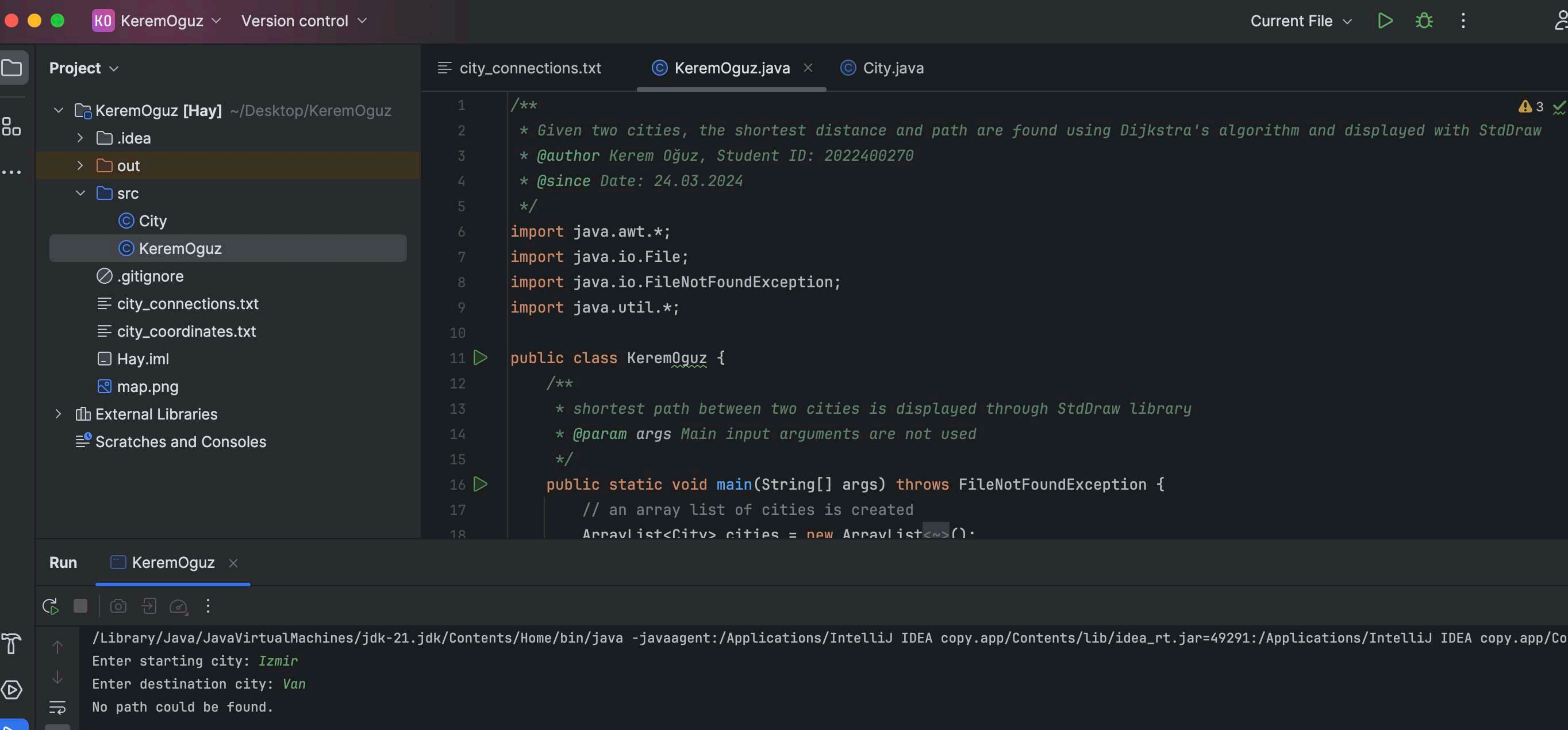


References:

- www.medium.com (took the gif)
- www.geeksforgeeks.org (took information about the algorithm)
- www.youtube.com (looked at how it is implemented)
- www.chatgpt.com (asked the things that I didn’t understand in the YouTube videos)
- www.w3schools.com (sometimes checked Java syntax)

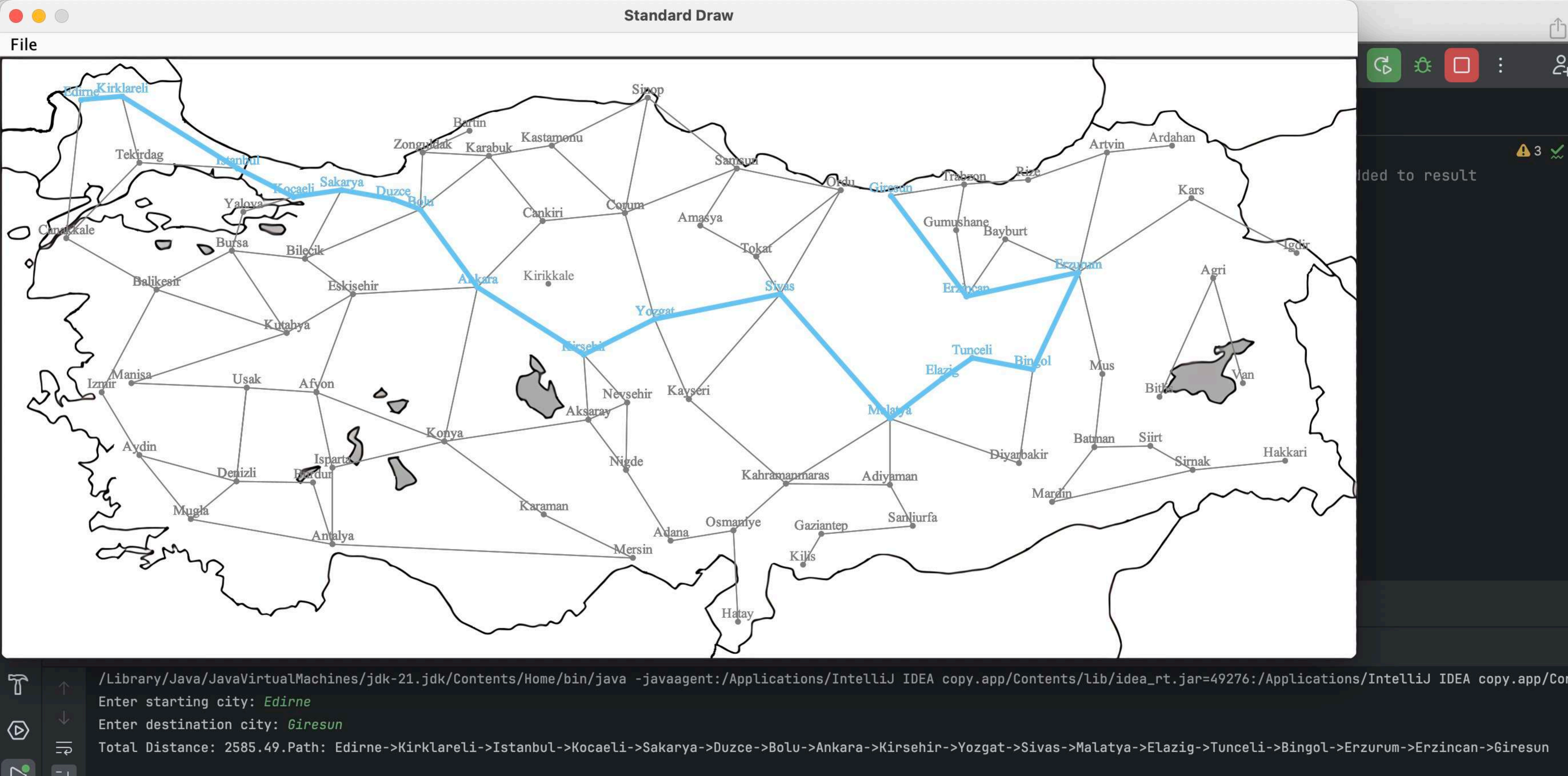
PSEUDO CODE:

```
function shortestPath(cities, connections, source, destination):
    // Initialize source city cost to 0
    source.cost = 0

    // Create a visited list to prevent revisiting cities
    visited = new ArrayList()

    // Start with the source city
    current = source

    // Loop until destination is visited
    while destination not in visited:
        // Mark current city as visited
        visited.add(current)

        // Iterate through neighbors of current city
        for neighbor in connections.get(indexOf(current)):
            if neighbor not in visited:
                // Calculate cost from source to neighbor
                cost = current.cost + distance(current, neighbor)

                // Update neighbor's cost if smaller than current cost
                if cost < neighbor.cost:
                    neighbor.cost = cost
                    neighbor.previousCities = copy(current.previousCities)
                    neighbor.previousCities.add(current)

        // Select unvisited city with smallest known distance
        minDistance = Double.MAX_VALUE
        for city in cities:
            if city not in visited and city.cost < minDistance:
                minDistance = city.cost
                current = city

        // If all unvisited cities have infinite cost, destination is unreachable
        if minDistance == Double.MAX_VALUE:
            return null

    // Reconstruct the shortest path
    result = new ArrayList()
    result.addAll(destination.previousCities)
    result.add(destination)

    return result
```

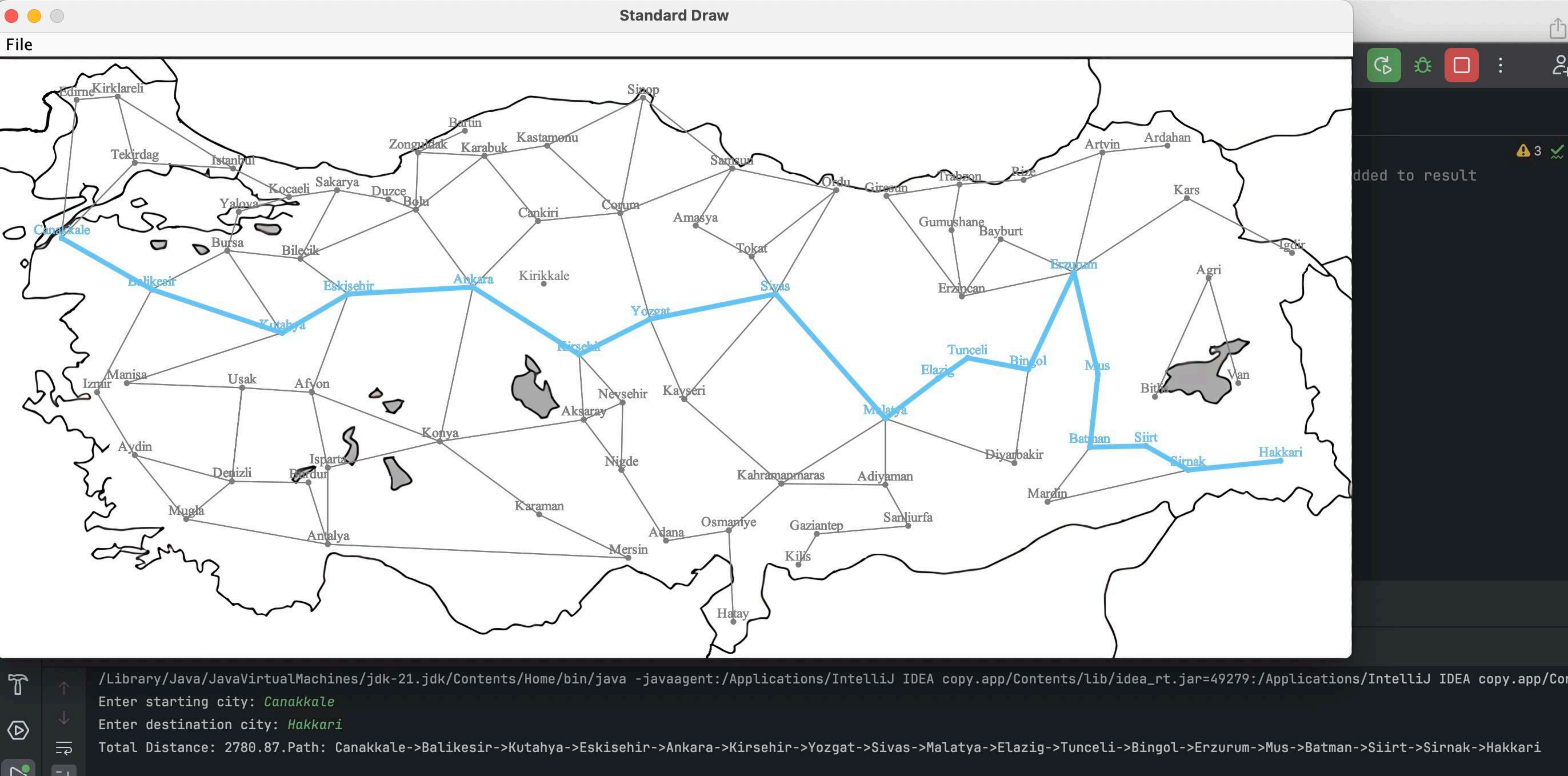


```java
/**
 * Given two cities, the shortest distance and path are found using Dijkstra's algorithm and displayed with StdDraw
 * @author Kerem Oğuz, Student ID: 2022400270
 * @since Date: 24.03.2024
 */
import java.awt.*;
import java.io.File;
import java.io.FileNotFoundException;
import java.util.*;

public class KeremOguz {
    /**
     * shortest path between two cities is displayed through StdDraw library
     * @param args Main input arguments are not used
     */
    public static void main(String[] args) throws FileNotFoundException {
        // an array list of cities is created
        ArrayList<City> cities = new ArrayList<~>();
```

```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=49291:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Izmir
Enter destination city: Van
No path could be found.
```

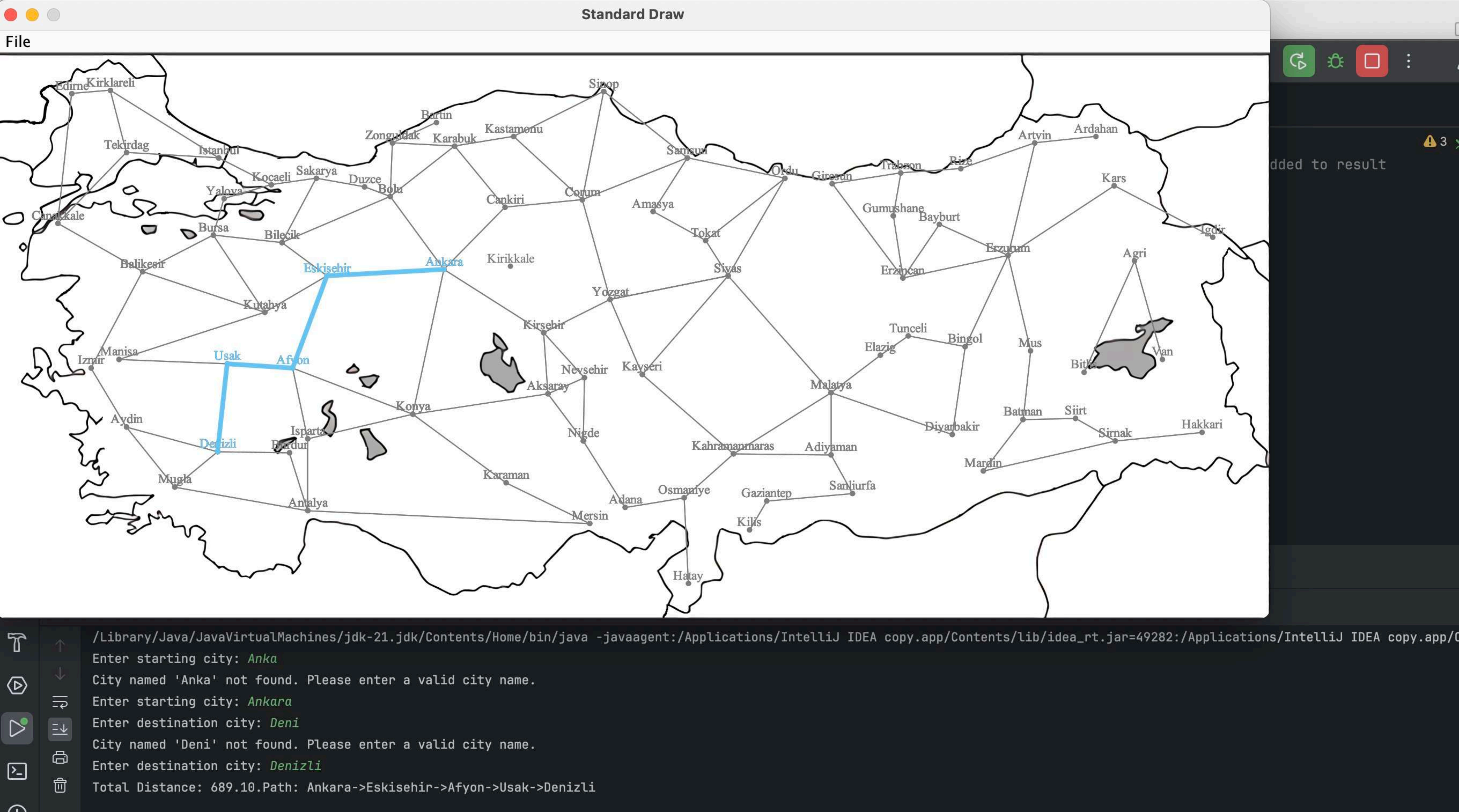


```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=49276:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Edirne
Enter destination city: Giresun
Total Distance: 2585.49.Path: Edirne->Kirklareli->Istanbul->Kocaeli->Sakarya->Duzce->Bolu->Ankara->Kirsehir->Yozgat->Sivas->Malatya->Elazig->Tunceli->Bingol->Erzurum->Erzincan->Giresun
```

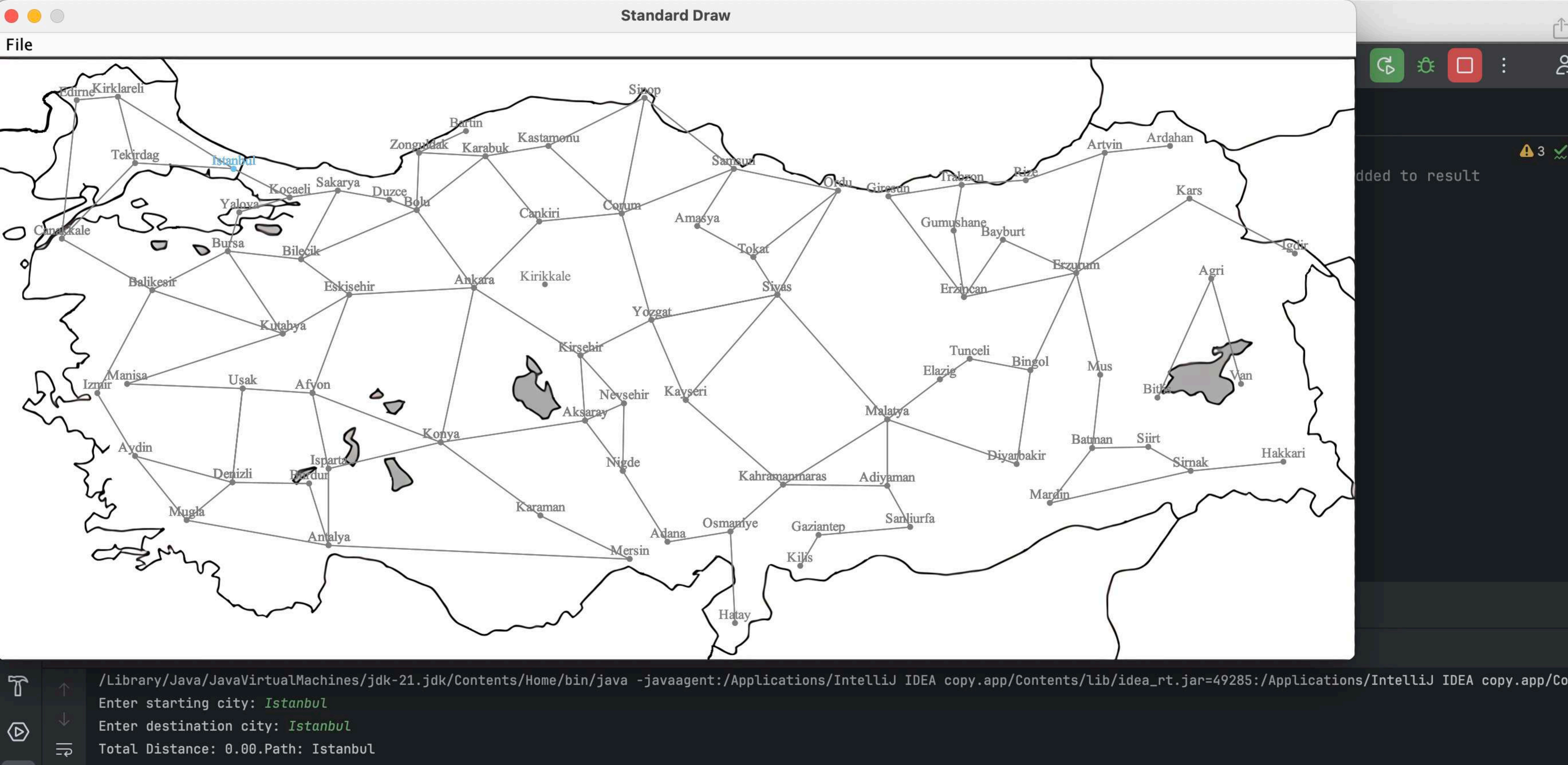


```
dded to result
```

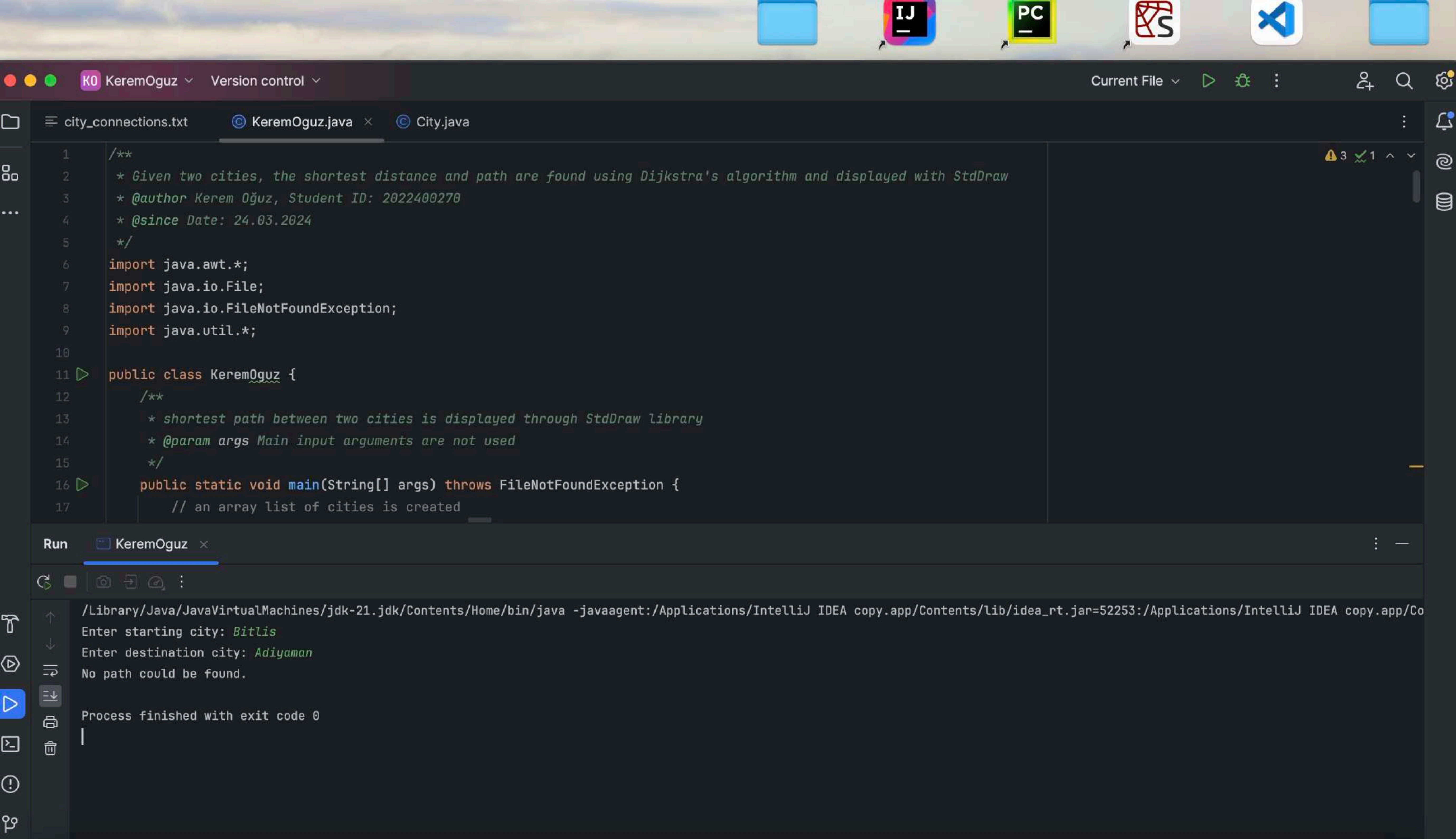
```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=49279:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Canakkale
Enter destination city: Hakkari
Total Distance: 2780.87.Path: Canakkale->Balikesir->Kutahya->Eskisehir->Ankara->Kirsehir->Yozgat->Sivas->Malatya->Elazig->Tunceli->Bingol->Erzurum->Mus->Batman->Siirt->Sirnak->Hakkari
```



```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=49282:/Applications/IntelliJ IDEA copy.app/C
Enter starting city: Anka
City named 'Anka' not found. Please enter a valid city name.
Enter starting city: Ankara
Enter destination city: Deni
City named 'Deni' not found. Please enter a valid city name.
Enter destination city: Denizli
Total Distance: 689.10.Path: Ankara->Eskisehir->Afyon->Usak->Denizli
```

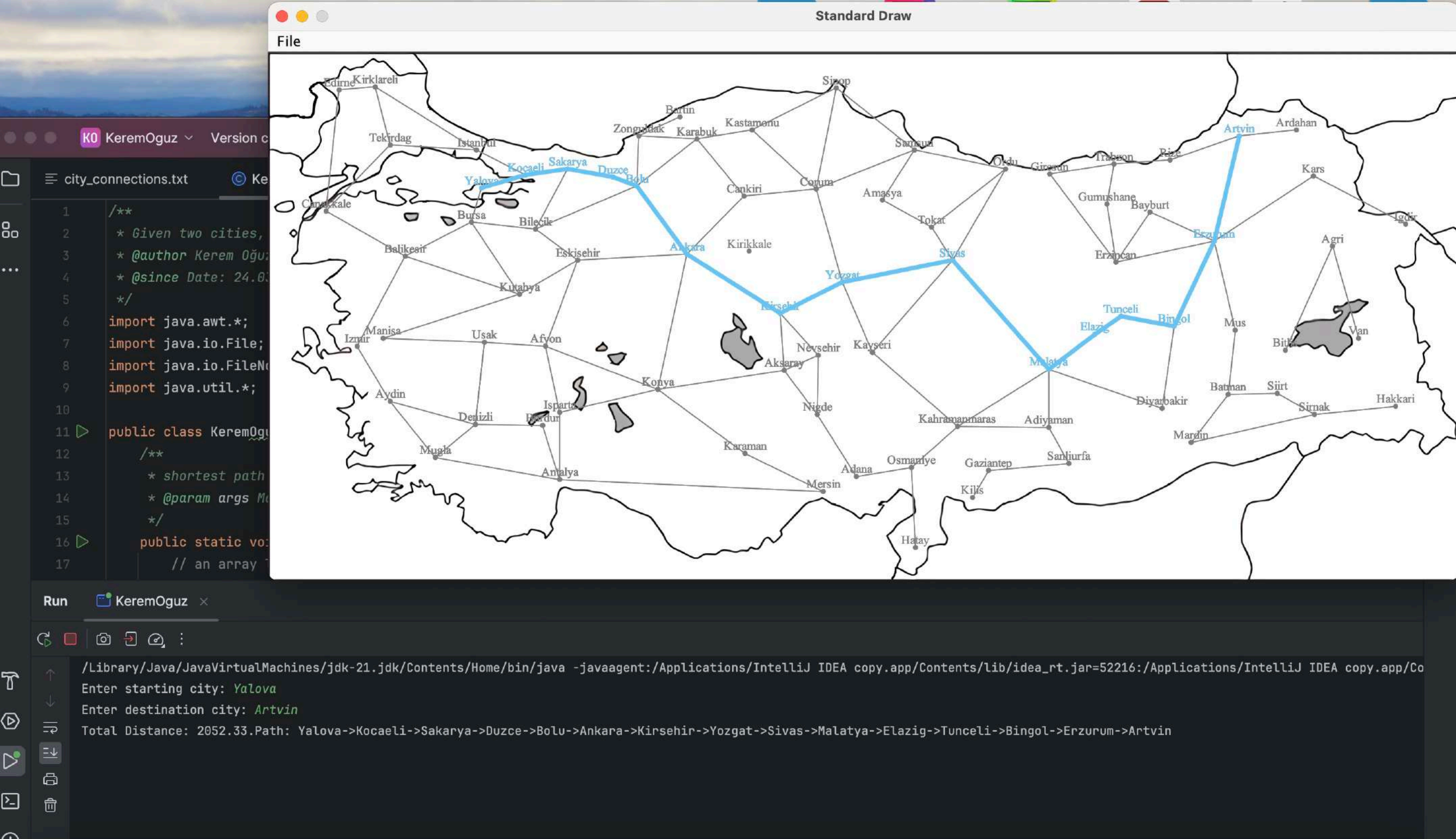


```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=49285:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Istanbul
Enter destination city: Istanbul
Total Distance: 0.00.Path: Istanbul
```



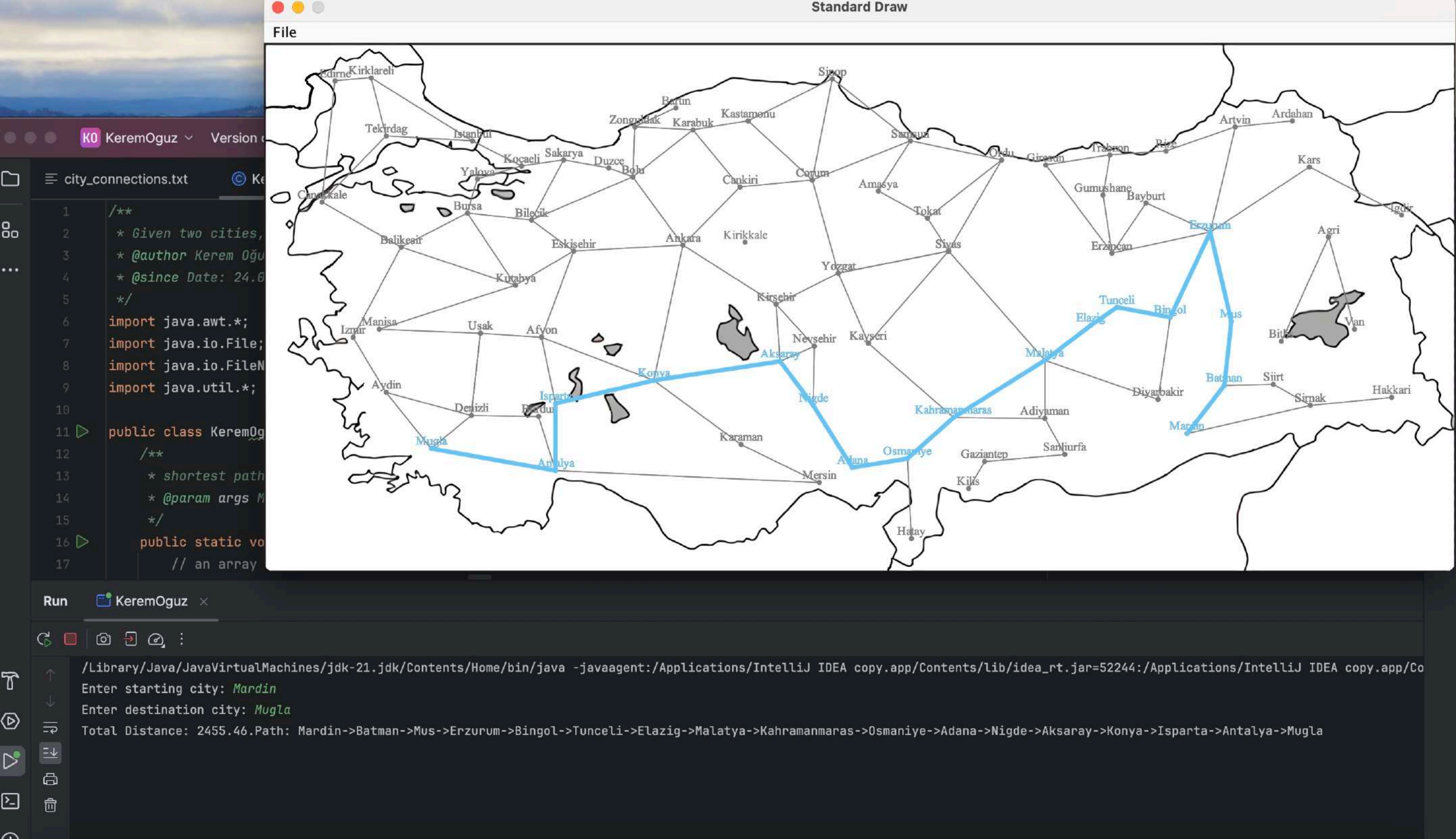
```
/**
 * Given two cities, the shortest distance and path are found using Dijkstra's algorithm and displayed with StdDraw
 * @author Kerem Oğuz, Student ID: 2022400270
 * @since Date: 24.03.2024
 */
import java.awt.*;
import java.io.File;
import java.io.FileNotFoundException;
import java.util.*;

public class KeremOguz {
    /**
     * shortest path between two cities is displayed through StdDraw library
     * @param args Main input arguments are not used
     */
    public static void main(String[] args) throws FileNotFoundException {
        // an array list of cities is created
```

```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=52253:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Bitlis
Enter destination city: Adiyaman
No path could be found.

Process finished with exit code 0
```



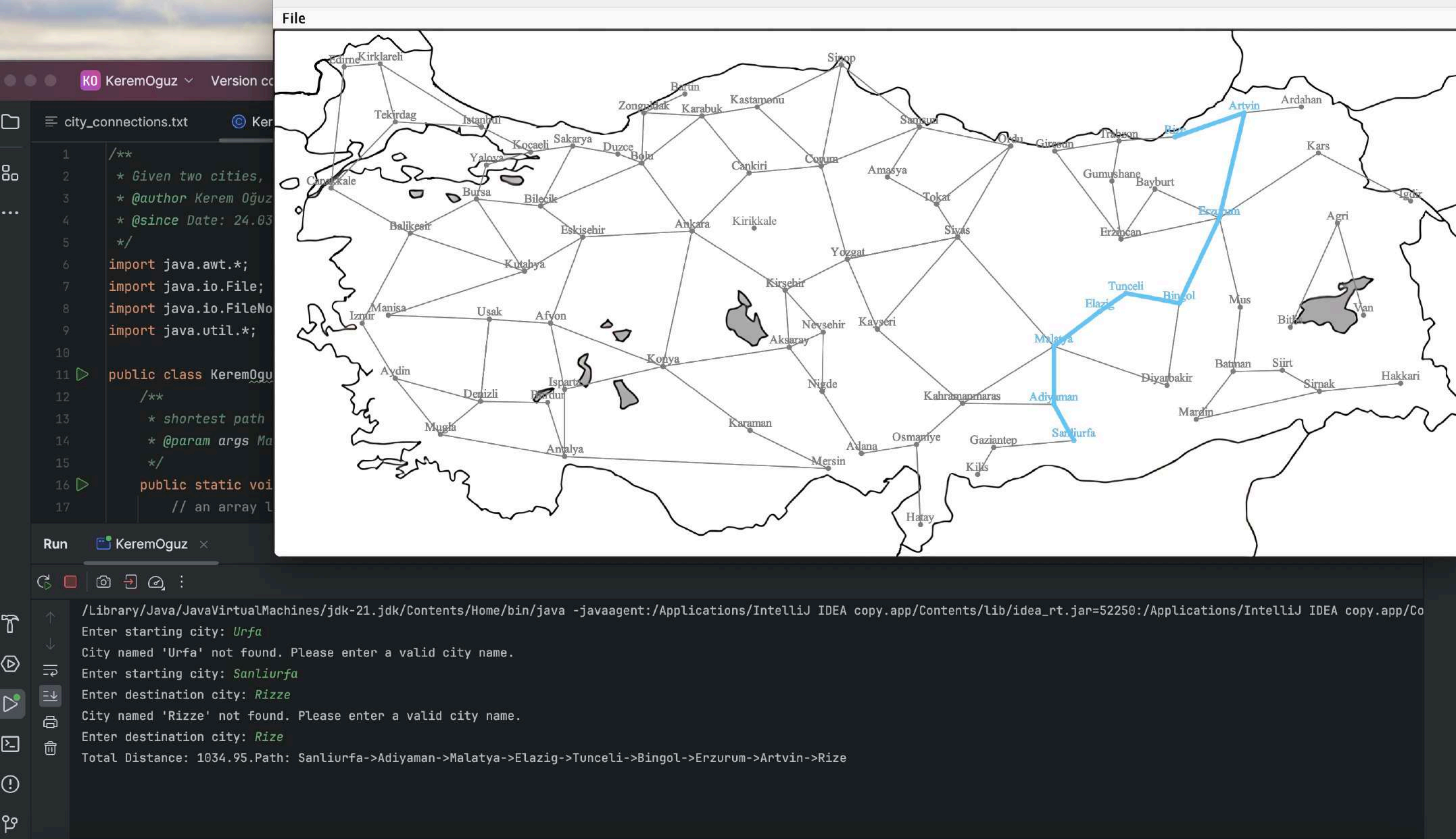
```
/**
 * Given two cities,
 * @author Kerem Oğu
 * @since Date: 24.0
 */
import java.awt.*;
import java.io.File;
import java.io.FileN
import java.util.*;

public class KeremOgu
    /**
     * shortest path
     * @param args M
     */
    public static vo
        // an array
```

```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=52216:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Yalova
Enter destination city: Artvin
Total Distance: 2052.33.Path: Yalova->Kocaeli->Sakarya->Duzce->Bolu->Ankara->Kirsehir->Yozgat->Sivas->Malatya->Elazig->Tunceli->Bingol->Erzurum->Artvin
```



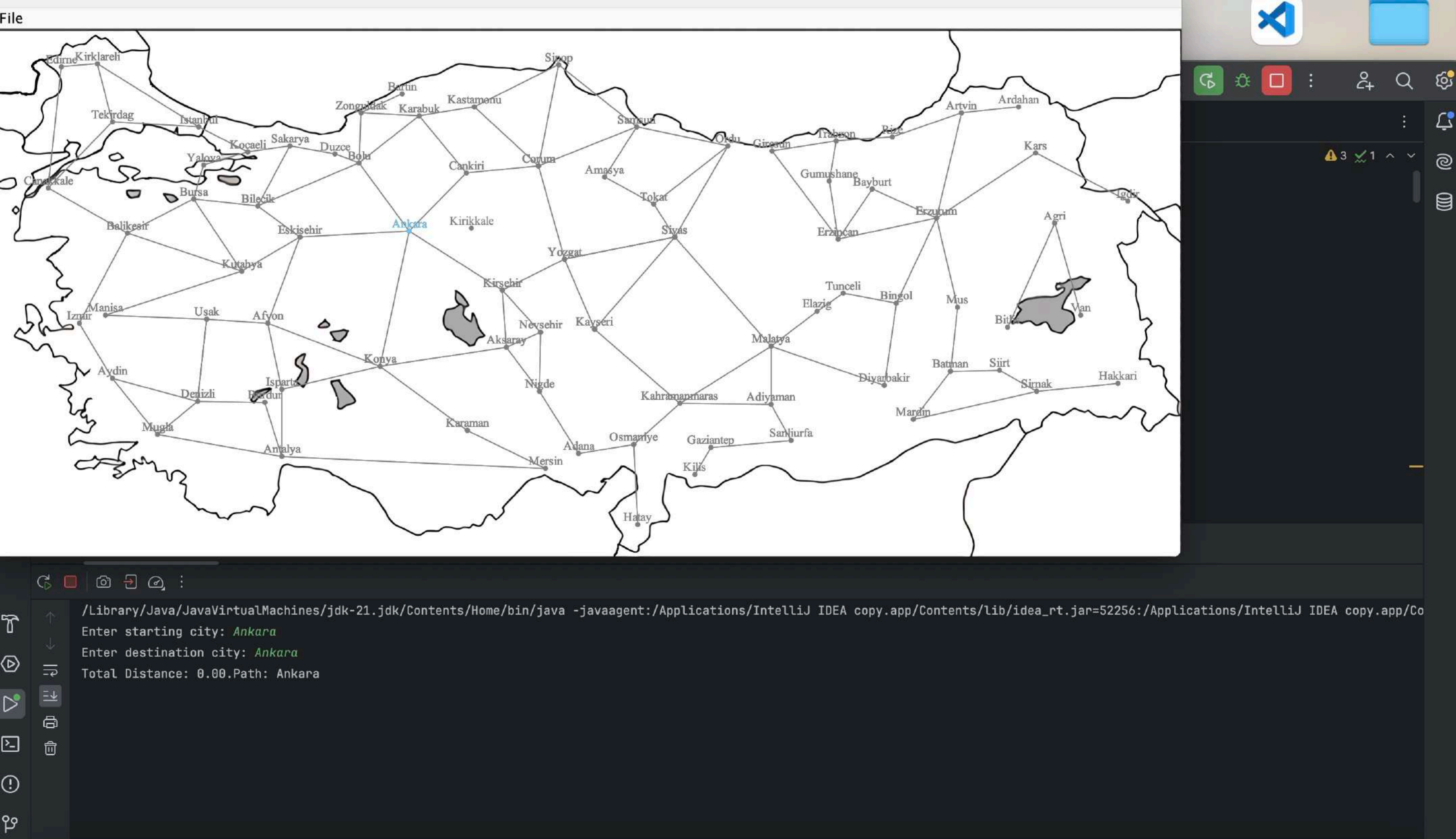
```
/**
 * Given two cities,
 * @author Kerem Oğu
 * @since Date: 24.0
 */
import java.awt.*;
import java.io.File;
import java.io.FileN
import java.util.*;

public class KeremOg
    /**
     * shortest path
     * @param args M
     */
    public static vo
        // an array
```

```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=52244:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Mardin
Enter destination city: Mugla
Total Distance: 2455.46.Path: Mardin->Batman->Mus->Erzurum->Bingol->Tunceli->Elazig->Malatya->Kahramanmaras->Osmaniye->Adana->Nigde->Aksaray->Konya->Isparta->Antalya->Mugla
```



```
/**
 * Given two cities,
 * @author Kerem Oğuz
 * @since Date: 24.03
 */
import java.awt.*;
import java.io.File;
import java.io.FileNo
import java.util.*;

public class KeremOgu
    /**
     * shortest path
     * @param args Ma
     */
    public static voi
        // an array l
```

```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=52250:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Urfa
City named 'Urfa' not found. Please enter a valid city name.
Enter starting city: Sanliurfa
Enter destination city: Rizze
City named 'Rizze' not found. Please enter a valid city name.
Enter destination city: Rize
Total Distance: 1034.95.Path: Sanliurfa->Adiyaman->Malatya->Elazig->Tunceli->Bingol->Erzurum->Artvin->Rize
```



```
/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDEA copy.app/Contents/lib/idea_rt.jar=52256:/Applications/IntelliJ IDEA copy.app/Co
Enter starting city: Ankara
Enter destination city: Ankara
Total Distance: 0.00.Path: Ankara
```