

# WHEN PLANNING A TRIP, IS THE OBVIOUS ROUTE ALWAYS THE CHEAPER ONE?



A web scraping and data analysis project that examines plane ticket prices to determine if the most obvious routes are always the most affordable

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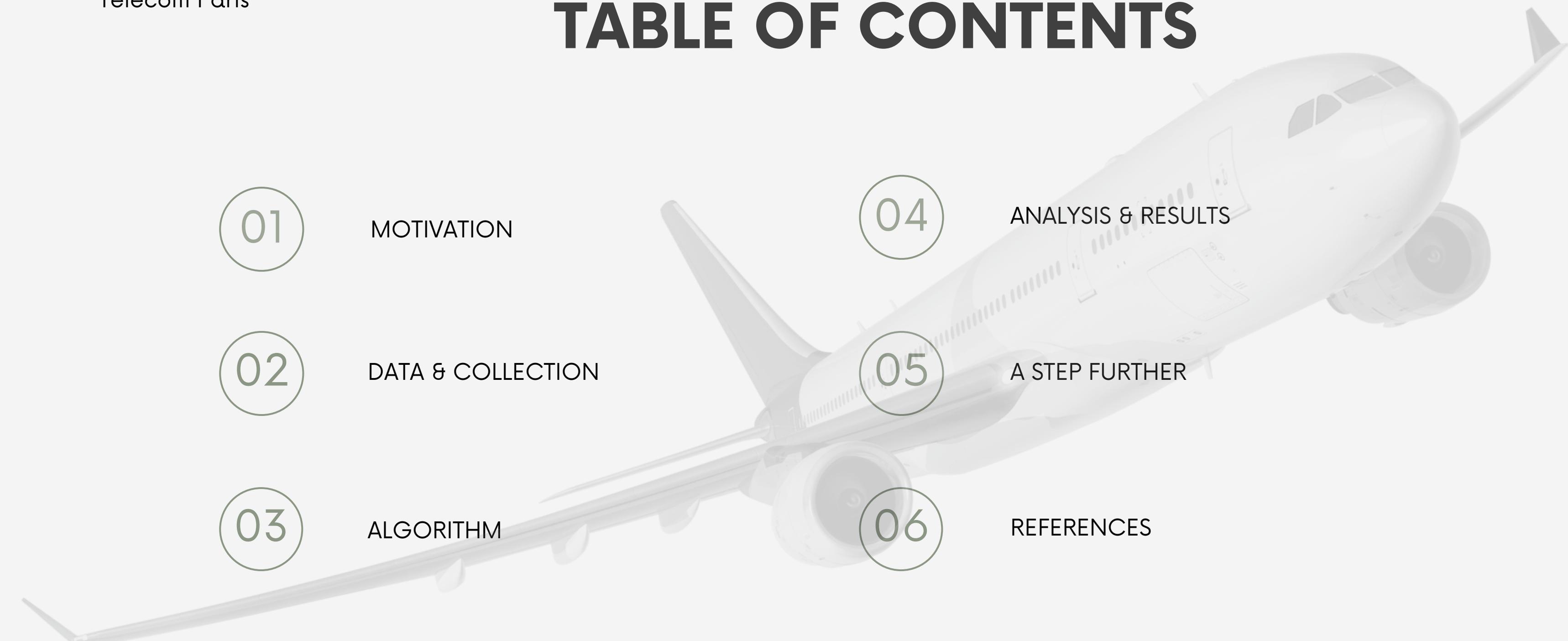
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# MOTIVATION

With millions of trips taking place every year, making travel more affordable and efficient has become essential. Finding optimal routes not only reduces costs but also improves accessibility for passengers around the world.



IMAGE 1: STATISTICS ON FLIGHT PASSANGERS IN 2023

02

# DATA COMMON TRIPS

IN TOTAL, WE COLLECTED  
11 DIFFERENT ROUTES

## WHERE

UNITED STATES (EAST & WEST) AND EUROPE

## WHO

YOUNG ADULTS AND RETIRED PEOPLE

## WHEN

SUMMER 2025

Starting from cities known for  
their youth/elder communities

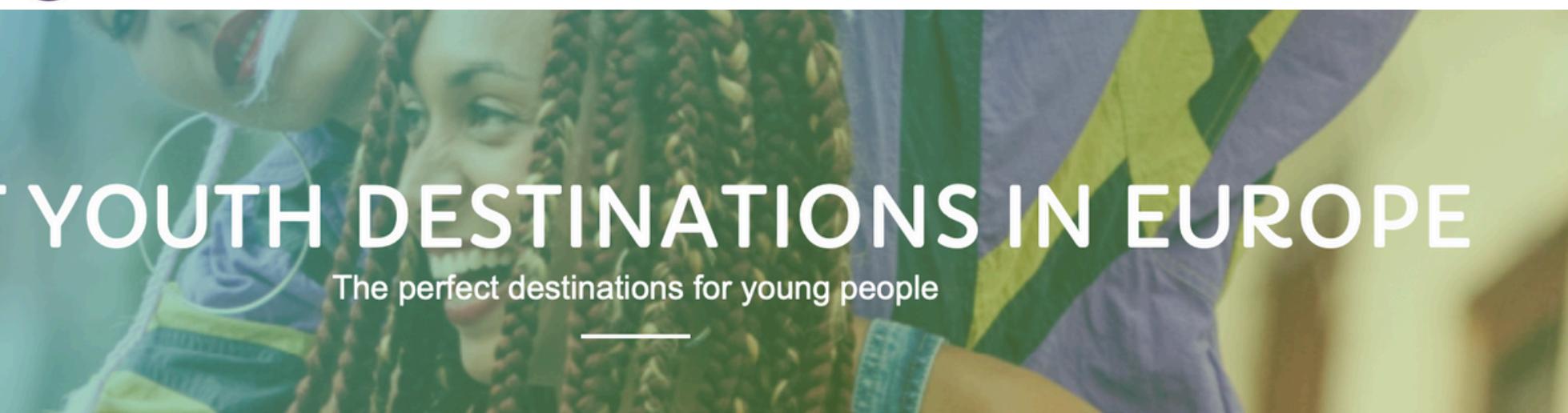
# Mapped: Europe's student destination hotspots

14 Mar 2024

## Best Beaches on the East Coast for Young Adults



The Getmyboat Editors • 6 months, 4 weeks ago



### YOUTH DESTINATIONS IN EUROPE

The perfect destinations for young people



### Senior Travel: Europe's Comfortable Spots 2025

r/Europetravel • 8 mo. ago  
CommercialBig7008

### What cities are an absolute must visit for those in their 20s?

Destinations

I'm a 24M and I'm very into the party, bar hopping, and clubbing lifestyle people have in their 20s. This summer plan to do some solo travelling and will be staying in hostels. I want to visit cities where you get to experience



DESTINATIONS ▾

IDEAS & II

[Home](#) > [European Tours](#) > [Europe Guide](#)

## 7 Best Places to Visit in Europe for Seniors

ADDUS FAMILY OF COMPANIES

### Coloring 10 Destinations for Senior Citizens in the United States

Rankings / USA / Best Party Cities in the U.S.

## Best Party Cities in the U.S.



By Alissa Grisler

✓ Reviewed by Elizabeth Von Tersch

Last updated on Aug. 3, 2023

# EXAMPLE

## ROUTE 1

A trip for young adults in Europe, starting on July 1st 2025

Leaving from Paris and going to Ibiza, Split, Lisboa, Barcelona & Berlin,  
spending 4 days in each city

# COLLECTION

**DISTANCE.TO** WAS USED TO EXTRACT THE DISTANCES BETWEEN ALL CITIES

THE **AMADEUS API** PROVIDED THE MINIMUM FLIGHT PRICES FOR EACH CITY-CITY ROUTE

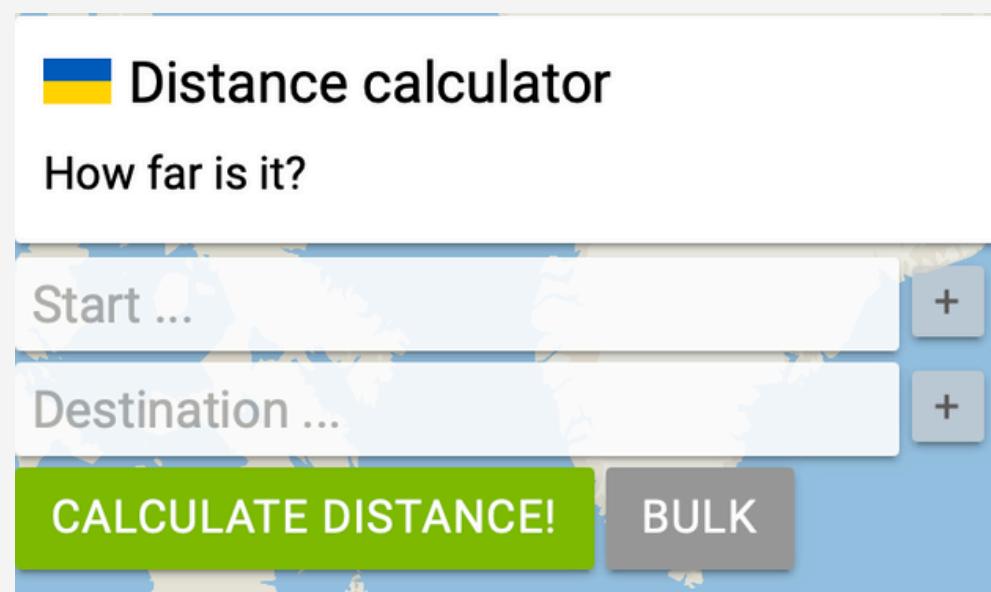


IMAGE 2: DISTANCE.TO CALCULATION TOOL

THE **DISTANCE.TO** IS AN ONLINE TOOL THAT CALCULATES THE DISTANCE BETWEEN TWO LOCATIONS, OFFERING STRAIGHT-LINE AND DRIVING DISTANCES IN VARIOUS UNITS.

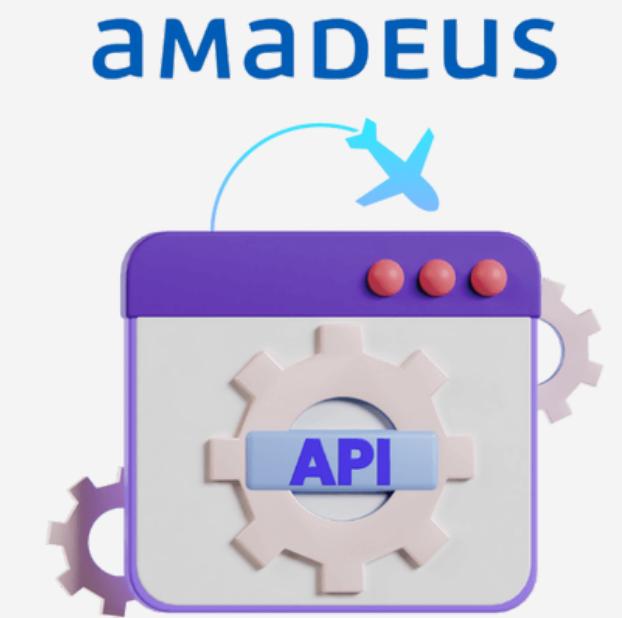


IMAGE 3: AMADEUS API LOGO

THE **AMADEUS API** OFFERS DEVELOPERS ACCESS TO AIR TRAVEL DATA, INCLUDING FLIGHT SEARCH, BOOKING, PRICING, AND AVAILABILITY

# COLLECTION

For each route, and each combination of cities in it, we collected all city-city distances and the minimum flight prices, across all possible dates.

**Leading to 2560 combinations**

# COLLECTION

## ABOUT THE DATES:

- We set on traveling every 4 days, to make the data collection reasonable
- All 11 routes were tested starting on the 1st of July & on the 1st of August

**Resulting in 22 instances**

# EXAMPLE

A trip for young adults in Europe, starting on July 1st 2025

Leaving from Paris and going to Ibiza, Split, Lisboa, Barcelona & Berlin, spending 4 days in each city

Route Number	Origin City	Destination City	Date	Distance (km)	Price	
0	1	PARIS	SPLIT	2025/07/01	1234.20	174.67
1	1	PARIS	LISBON	2025/07/01	1452.72	140.11
2	1	PARIS	BERLIN	2025/07/01	878.40	150.93
3	1	PARIS	BARCELONA	2025/07/01	830.16	127.77
4	1	PARIS	IBIZA	2025/07/01	1101.10	178.25
5	1	SPLIT	BARCELONA	2025/07/05	1193.56	168.33
6	1	SPLIT	BARCELONA	2025/07/09	1193.56	108.01
7	1	SPLIT	BARCELONA	2025/07/13	1193.56	98.00
8	1	SPLIT	BARCELONA	2025/07/17	1193.56	172.95

TABLE 1:FLIGHTS.CSV, CAN BE FOUND ON OUR PROJECT'S GITHUB

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03

# ALGORITHM - GREEDY ROUTE

## OBJECTIVE

SIMULATE THE PROCESS OF A PERSON SELECTING THE ORDER OF CITIES  
IN THEIR TRIP

## METHOD

FROM THE START CITY, ALWAYS CHOOSE THE NEAREST ONE UNTIL DONE,  
THEN RETURN TO THE START.

03

# ALGORITHM - OPTIMAL ROUTE

## PROBLEM

FIND THE ROUTE WITH THE LOWEST COST

## CONSTRAINTS

- EACH CITY MUST BE VISITED ONLY ONCE, REGARDLESS OF THE DAY.
- A PERSON CAN ONLY BE IN ONE CITY EACH DAY.
- EVERY DESTINATION CITY MUST ALSO SERVE AS THE ORIGIN FOR ANOTHER ROUTE.

## DATA OPTIMIZATION

ONLY VALID AND POSSIBLE ROUTES ARE CONSIDERED

# EXAMPLE

## RESULT

GREDDY ROUTE - €722.01



IMAGE 4: EUROPE MAP, GOOGLE 2025

PARIS → BARCELONA → IBIZA →  
LISBON → SPLIT → BERLIN → PARIS

OPTIMAL ROUTE - €660.24

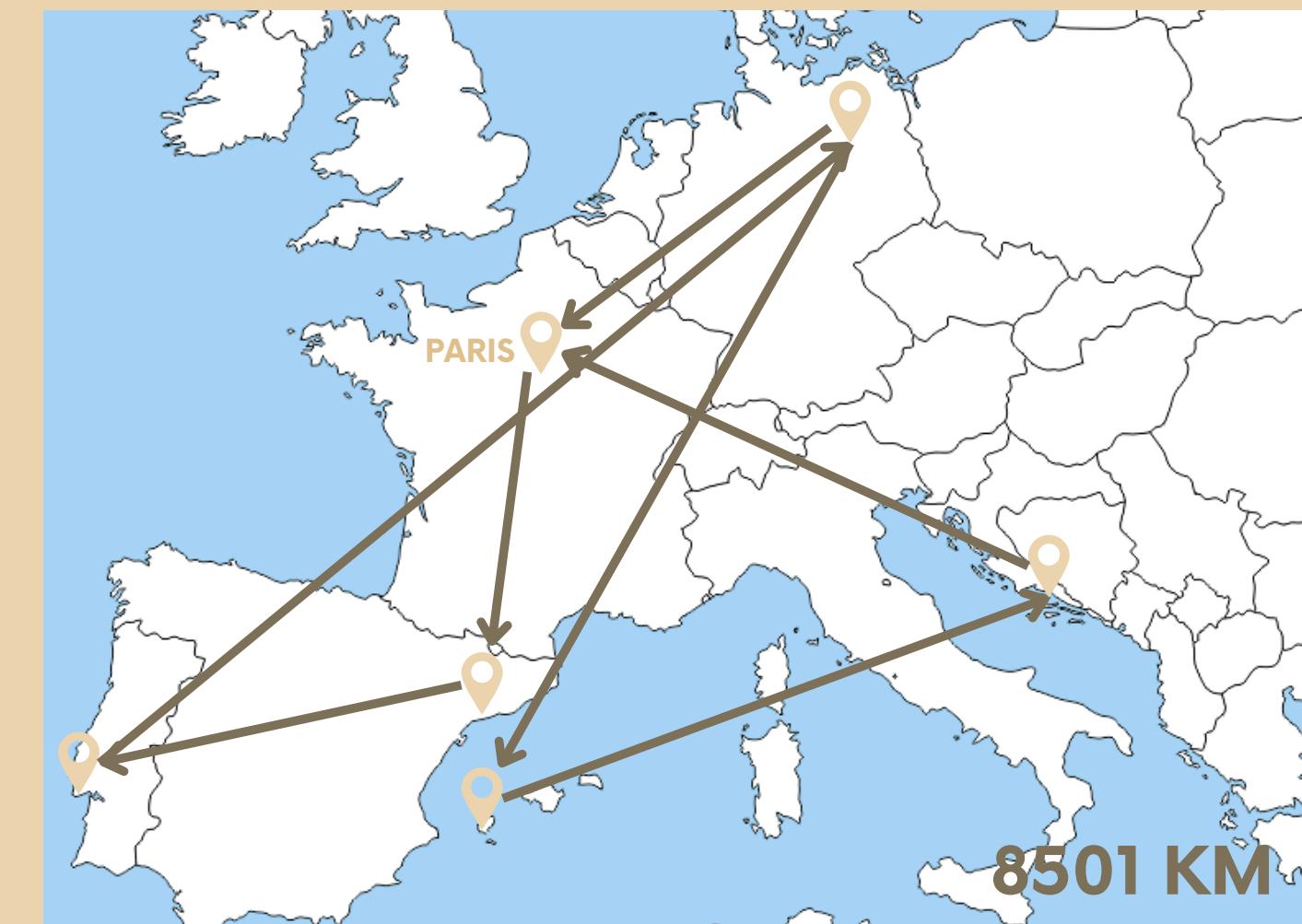


IMAGE 5: EUROPE MAP, GOOGLE 2025

PARIS → BARCELONA → LISBON →  
BERLIN → IBIZA → SPLIT → PARIS

04

# ANALYSIS

IN ALL 22 INSTANCES,

The total price of the greedy route was higher than the optimal price

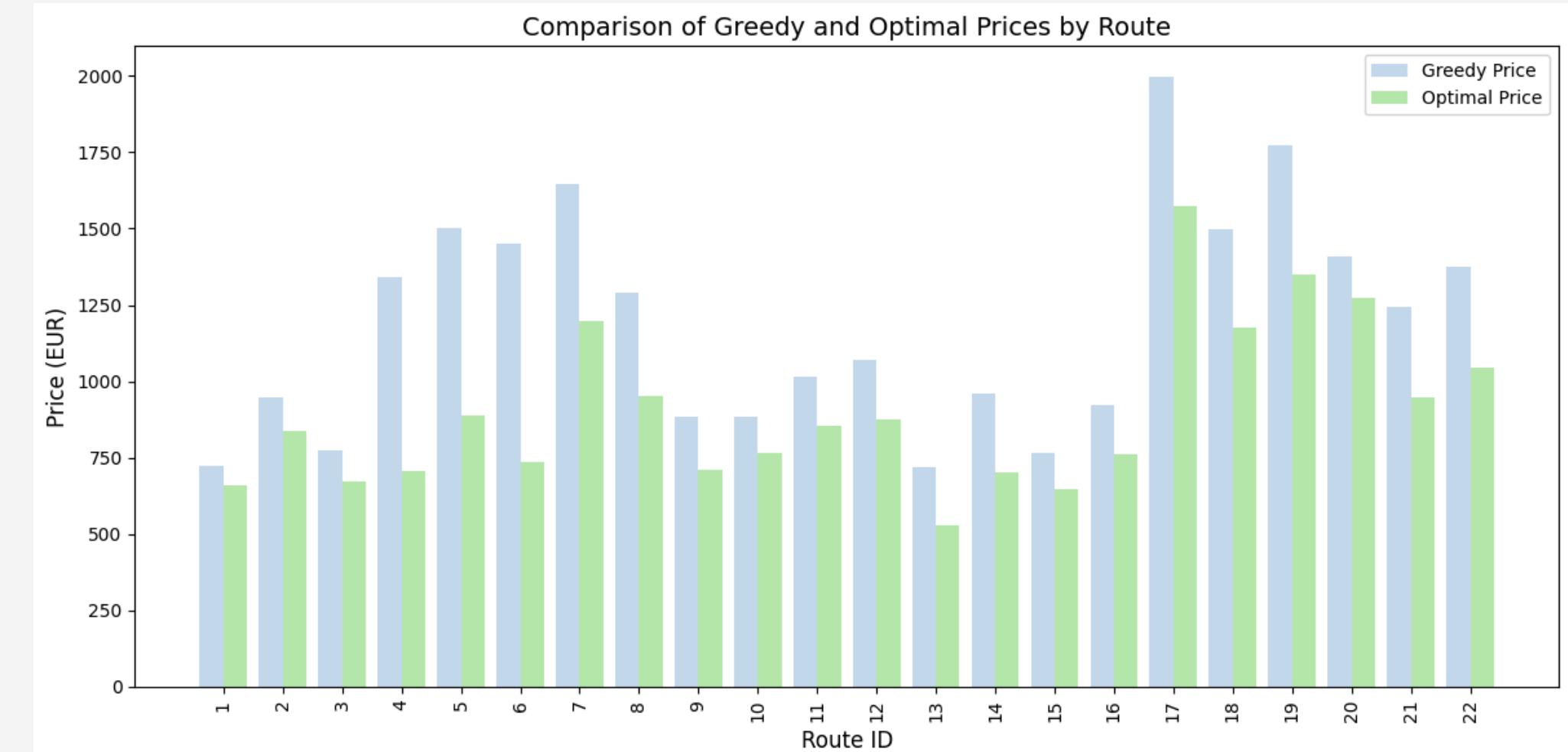


IMAGE 6: COMPARISON OF GREEDY AND OPTIMAL PRICES BY ROUTE, CAN BE FOUND ON GITHUB.

## THE AVERAGE PRICE DIFFERENCE IS **€287.67**

With the lowest price difference between greedy and optimal prices being **€61.77** and the highest **€713.38**, with a standard deviation of **€187.19**.

## THE AVERAGE DISTANCE DIFFERENCE IS **1038.37KM**

With the lowest difference between greedy and optimal prices being **0km** and the highest **3697km**, with a standard deviation of **1787.86Km**.

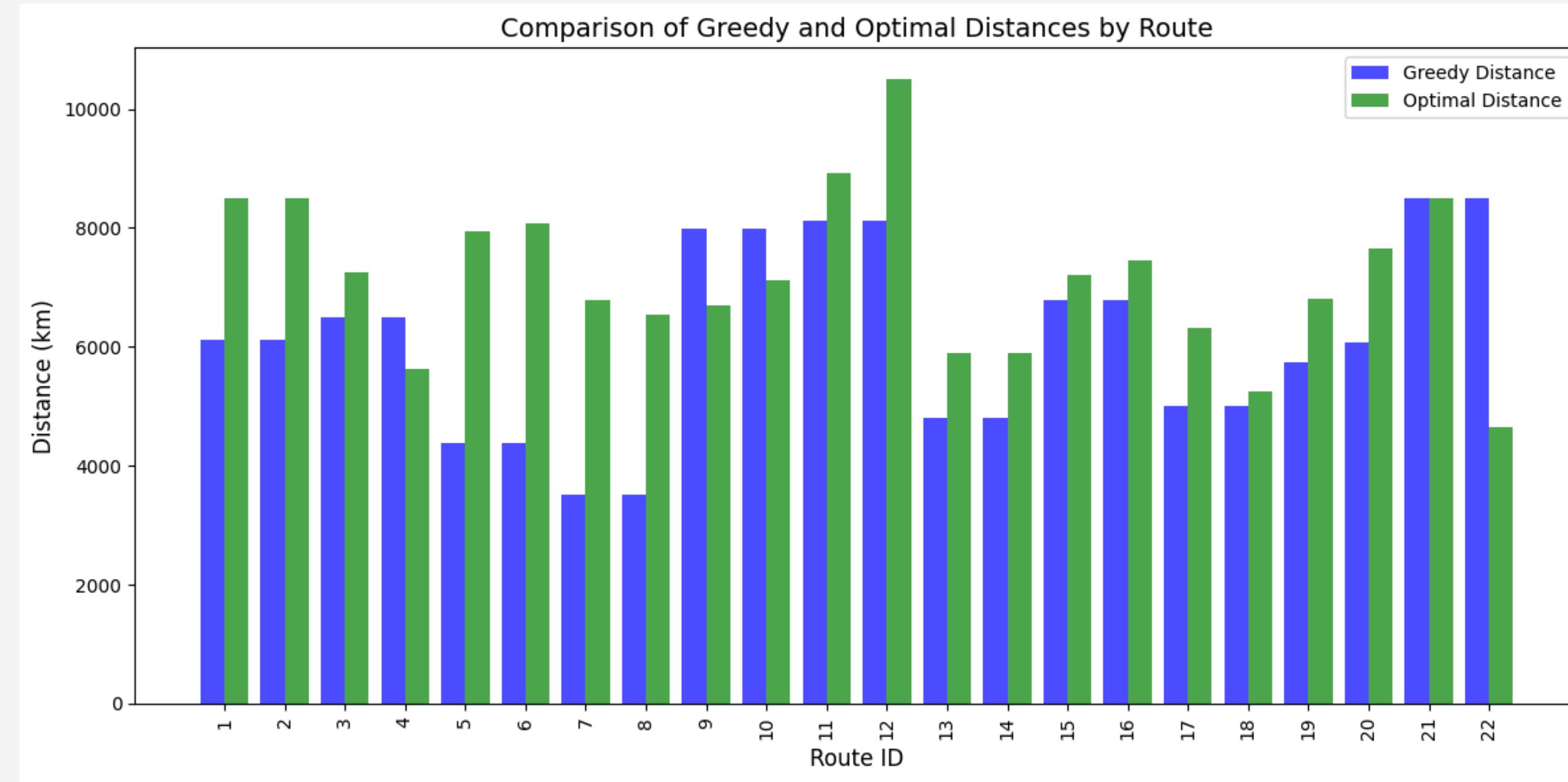
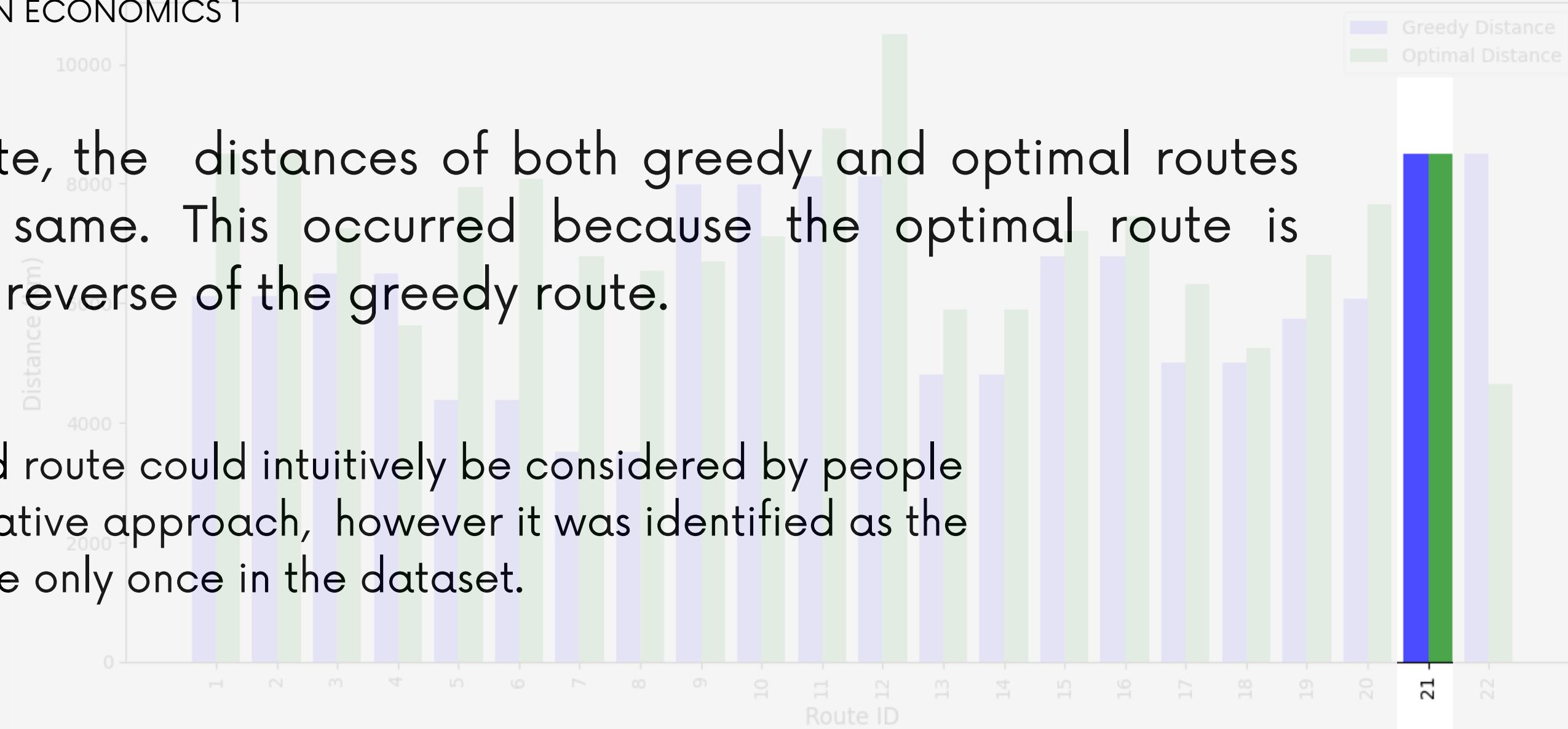


IMAGE 7: COMPARISON OF GREEDY AND OPTIMAL DISTANCES BY ROUTE, FOUND ON GITHUB

An interesting observation from the chart is that the optimal route distance is sometimes shorter than the greedy route distance. This occurs because the greedy algorithm prioritizes immediate cost savings at each step without considering the overall journey.

Comparison of Greedy and Optimal Distances by Route



This reversed route could intuitively be considered by people as an alternative approach, however it was identified as the optimal route only once in the dataset.

IMAGE 7: COMPARISON OF GREEDY AND OPTIMAL DISTANCES BY ROUTE, FOUND ON GITHUB

## GREEDY ROUTE

SANTA BARBARA → PALM SPRINGS → JACKSON HOLE → PORTLAND → NAPA VALLEY → CHICAGO → SANTA BARBARA

## OPTIMAL ROUTE

SANTA BARBARA → CHICAGO → NAPA VALLEY → PORTLAND → JACKSON HOLE → PALM SPRINGS → SANTA BARBARA

OUT OF 11 TRIPS ANALYZED, 2 TRIPS MAINTAINED THE SAME OPTIMAL ROUTE IN BOTH JULY AND AUGUST, WITH AUGUST BEING, ON AVERAGE, 175,07 MORE EXPENSIVE.

And in some cases, the changes between the July and August routes were drastic, which shows great volatility in the data across months.

## ROUTES 21 & 22

### JULY

SANTA BARBARA → CHICAGO → NAPA VALLEY → PORTLAND → JACKSON HOLE → PALM SPRINGS → SANTA BARBARA

GREEDY PRICE: €1,245.68  
OPTIMAL PRICE: €945.44

GREEDY DISTANCE: 8497.26 KM  
OPTIMAL DISTANCE: 8497.26 KM

### AUGUST

SANTA BARBARA → PALM SPRINGS → CHICAGO → NAPA VALLEY → JACKSON HOLE → PORTLAND → SANTA BARBARA

GREEDY PRICE: €1,374.93  
OPTIMAL PRICE: €1,042.76

GREEDY DISTANCE: 8497.26 KM  
OPTIMAL DISTANCE: 4649.46 KM

# RESULTS

The greedy usual route is most likely not be the best one.

It is hard to predict a pattern for the optimal route, as flight prices are very volatile, as saw through the standard deviation of the price differences.

05

# A STEP FURTHER

As stated, the optimal route cannot be easily predicted, so this opens an opportunity to expand this work into a useful and innovative tool, as it would offer insights that are not intuitive for people planning their trips.

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# Questions?

# APPENDIX

Route ID	Start City	Start Date	Greedy Route	Optimal Route	Greedy Price	Optimal Price	Target Audience	Region	Subregion	Month	Trip ID	Greedy Distance	Optimal Route Distance
1	PARIS	2025-07-01	['BARCELONA', 'IBIZA', 'LISBON', 'SPLIT', 'BER...']	['BARCELONA', 'LISBON', 'BERLIN', 'IBIZA', 'SP...']	722.01	660.24	YOUNG	EUROPE	WEST	JULY	A	6122.17	8501.00
2	PARIS	2025-08-01	['BARCELONA', 'IBIZA', 'LISBON', 'SPLIT', 'BER...']	['BARCELONA', 'LISBON', 'BERLIN', 'IBIZA', 'SP...']	949.49	836.46	YOUNG	EUROPE	WEST	AUGUST	A	6122.17	8501.00
3	PARIS	2025-07-01	['NICE', 'ROME', 'MAJORCA', 'IBIZA', 'MYKONOS']	['MAJORCA', 'MYKONOS', 'IBIZA', 'ROME', 'NICE']	772.90	670.43	YOUNG	EUROPE	WEST	JULY	B	6493.99	7243.73
4	PARIS	2025-08-01	['NICE', 'ROME', 'MAJORCA', 'IBIZA', 'MYKONOS']	['MAJORCA', 'IBIZA', 'MYKONOS', 'ROME', 'NICE']	1338.91	707.53	YOUNG	EUROPE	WEST	AUGUST	B	6493.99	5634.91
5	TAMPA	2025-07-01	['FORT LAUDERDALE', 'MIAMI', 'WASHINGTON', 'NE...']	['FORT LAUDERDALE', 'NEW YORK CITY', 'MIAMI', ...]	1501.52	887.77	YOUNG	USA	EAST	JULY	C	4372.41	7950.58

TABLE 2: OUR ROUTES\_FINAL.CSV FILE, CAN BE FOUND ON GITHUB

[HTTPS://WWW.ZICASSO.COM/A/EUROPE/DE/SENIORS/TD](https://www.zicasso.com/a/europe/de/seniors/td)

[HTTPS://THETRAVELTINKER.COM/SENIOR-TRAVEL/SENIOR-TRAVEL/](https://thetraveltinker.com/senior-travel/senior-travel/)

[HTTPS://WWW.EUROPEANBESTDESTINATIONS.COM/BEST-OF-EUROPE/BEST-DESTINATIONS-FOR-TEENAGERS/](https://www.europeanbestdestinations.com/best-of-europe/best-destinations-for-teenagers/)

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TID=AFMBOORBIBR\_RRJQ5XB7GFJLEPLAOVTBOW8LDD0BIZB8WL3RWLZQLZUT

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