Small Worlds

Project

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Introduction

In this project, we will be working with a dataset from the Brazilian aviation network, which can be found at the following link: https://github.com/alvarofpp/dataset-flights-brazil.

The objective is to meet **five key** requirements, which will comprise **4 points in Unit 2**. A GitHub repository will be used to share the implemented solutions and the work performed will be documented using markdown cells in Jupyter Notebooks.

Submission Guidelines

The **GitHub repository** link containing your solution should be submitted for evaluation.

Generated figures should be included both in the Jupyter Notebook and separately in a dedicated repository folder.

Additionally, a maximum **five-minute video** (created using Loom) detailing the solution should be included in the repository's description.

README File

Your repository should include a README file **documenting all the steps** required to reproduce your results, a brief description of the major findings, figures, and the names of all group members.

REQUIREMENT 1

Perform a **study on the assortativity** of the network, considering the **REGION** where the airport is located as an attribute. Generate both statically and interactive graph similar to the ones used in the classroom, taking into account the REGION of the airport.

REQUIREMENT 2

Carry out a **bivariate analysis** between the vertex **degree** and the **average number of neighbors**. Create a similar graph considering the Brazilian network and all its Regions (North, Northeast, South, Southeast, and Central-West). Report your main findings.

REQUIREMENT 3

Determine how many **connected components** exist in the Brazilian air network. Characterize each component: quantity, percentage by region.

REQUIREMENT 4

Create a simulated scenario where a trip with
the following route is desired:
- City 1 (North) to City 2 (South)
- City 2 (South) to City 3 (Northeast)
- City 3 (Northeast) to City 4 (Central-West)
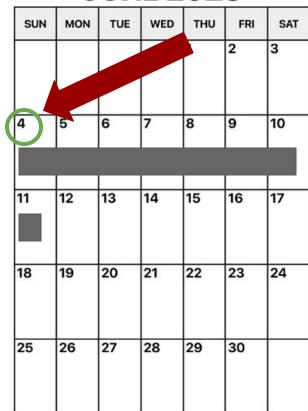- City 4 (Central-West) to City 5 (Southeast)

Using the concept of the **shortest path,** describe the journey
taken and the number of routes used. Provide a **cost estimate**
for this trip, including a simulation with dates and the
airline company, ensuring that the period from the first trip
to the last does not exceed 30 days.

REQUIREMENT 5

Conduct a study on the **Clustering Coefficient** considering the National Air Network, as well as the individual air sub-networks of each Region (North, Northeast, Central-West, South, and Southeast).

MAY 2023

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

JUNE 2023

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	