STRUCTURES Laboratory
DATA AND ALGORITHMS
Degree in Data Science (1st)
Academic year 2023-24

Practice No. 5: Binary search trees

Classroom exercise (L1)

Taking as reference the program**"pr5_v1.py"**, which you must have already done and tested, a new program must be written, called**"pr5_final.py"**, which allows analyzing population data in a set of municipalities in Spain. Specifically, we want to know which municipalities in this group have had an average population of inhabitants (between 1998 and 2022) greater than (or equal to) 50,000. To do this, it is necessary:

1. Create the binary search tree (ABB) of municipalities in Spain with the information obtained from the file**EvolMunicipios2022.csv**".

2. Create a list of municipalities to analyze with the information obtained from the file " **MunicipalitiesVariasProv.csv**", which contains the INE codes and the names of the municipalities. In this list it is only necessary to store the<u>Names</u> , codes are not necessary.

3. Search the names of all the municipalities loaded in step 2 in the ABB of municipalities in Spain (not the other way around). When a municipality is located, the average population must be determined considering all the years for which data is available. If the average population exceeds 50,000 inhabitants, its name code must be registered in a list.

4. Display the results of the process on the screen: number of municipalities searched, number of municipalities with an average population greater than or equal to 50,000 inhabitants and list of names of those municipalities.

The test bench with the expected results is provided below:

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INCREASE IN POPULATION
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- Municipalities searched: 4346
- Municipalities with average population >= 50,000:        53
- Names:
['Albacete', 'Roquetas de Mar', 'Ejido, El', 'Oviedo', 'Siero', 'Badajoz', 'Badalona', 'Barcelona',
'Castelldefels', 'Granollers', 'Manresa', ' Prat de Llobregat, El', 'Sabadell', 'Sant Boi de
Llobregat', 'Santa Coloma de Gramenet', 'Terrassa', 'Viladecans', 'Burgos', 'Algeciras', 'Chiclana
de la Frontera', 'Jerez de la Frontera', 'San Fernando', 'Ciudad Real', 'Ferrol', 'Santiago de
Compostela', 'Irun', 'Granada', 'Motril', 'Huelva', 'Linares', 'Lleida', ' Alcobendas', 'Aranjuez',
'Collado Villalba', 'Coslada', 'Fuenlabrada', 'Getafe', 'Madrid', 'Majadahonda', 'Parla', 'Rivas-
Vaciamadrid', 'Rozas de Madrid, Las', 'Valdemoro', 'Melilla', 'Palencia', 'Pontevedra', 'Vigo',
'Salamanca', 'Segovia', 'Gandia', 'Paterna', 'Sagunto/Sagunt', 'Zamora']
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