Developing a Visualization Tool to Monitor Reservoir Reserves in Spain

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Problem Description and Background

- Spain has been often struck by droughts, some very severe.
- In consequence, many reservoirs have been built.
- We can improve how data on this reservoirs are displayed, being more relevant to the interested parties.

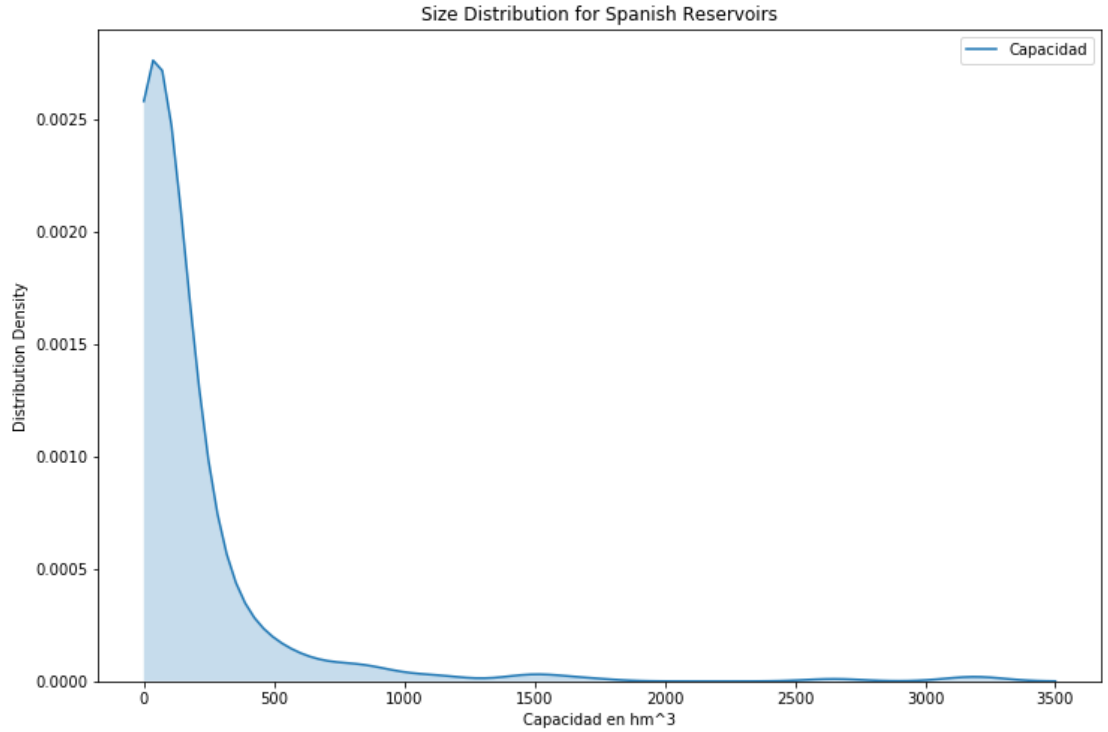
- Agriculture makes up a big part of Spain's economy so there are many potential stakeholders
- To the left number of reservoirs built per decade during the 20th century.

Data Description and Use for the Solution

- We have weekly data of reserves on around 360 reservoirs in the site embalses.net.
- Some other reservoirs only appear listed with their capacity. We will focus on the first group, not this one.
- We will use the Nominatim API and the OverPass API to find the shapes of the data in the OpenStreetMap Database.
- We will display each reservoir's silhouette in the map with a colour code for the reserves it has.

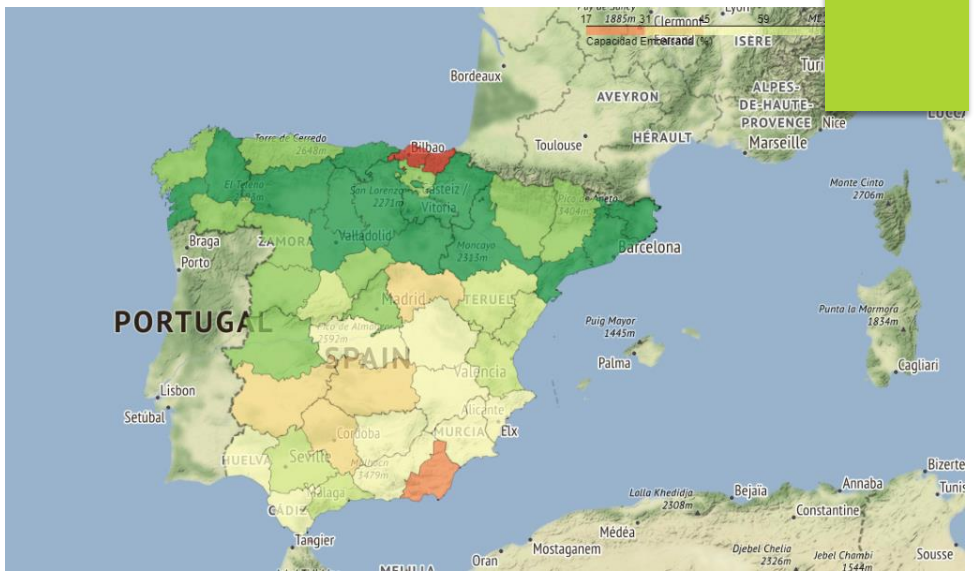
Exploratory Analysis

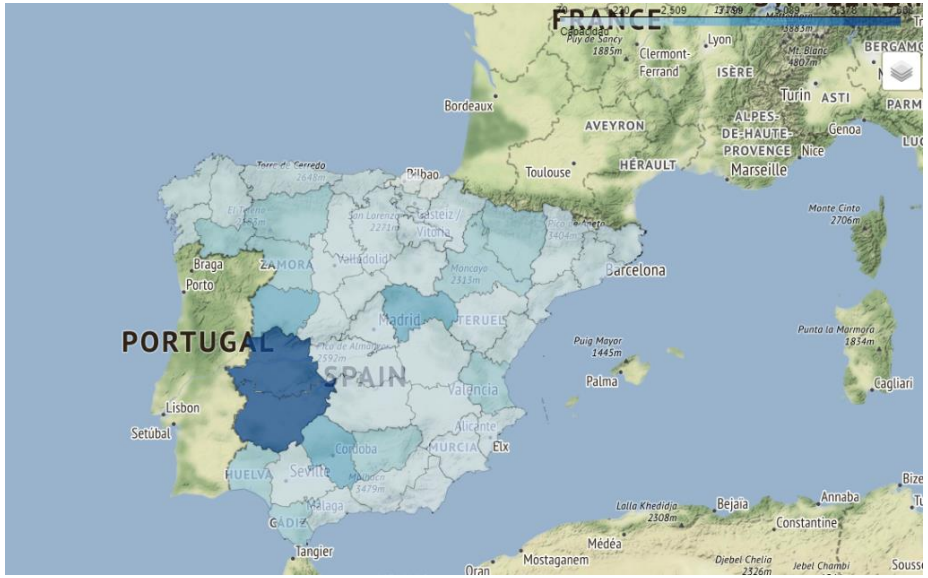
- We are interested in the distribution of reservoirs in size, as well as geographically.
- We have much more small reservoirs than large ones as shown in the graph.



Geographical Distribution of Reserves and Capacity

- In our preliminary exploration of the data we are interested in the geographical distribution.
- On the top figure, we can see the level of reserves relative to capacity in each province of Spain.
- We could think that there is a North-South divide in term of how full reservoirs are.
- In the bottom figure we can see the distribution of total storage capacity built.
- No pattern observed here other than the clear dominance of two provinces.





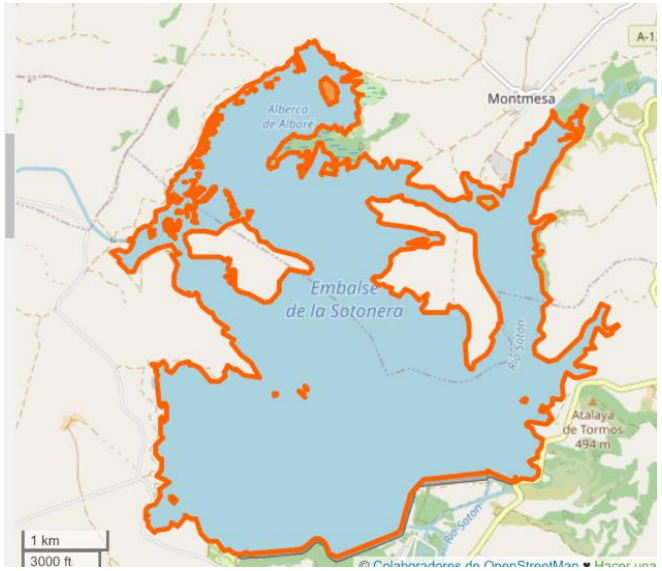
Methodology:

- We want to develop a tool capable of displaying reservoir reserves in a concise manner even at a very local level. Like in the image to the right. (Screenshot from the final tool).

- To do this we will use the OverPass API to abtain the nodes (and their coordinates) for all the lines composing the OpenStreetMap relation.

Miembros

- Vía 393051872 como outer
- Vía 452728452 como outer
- Vía 453380647 como outer
- Vía 393051952 como outer
- Vía 452728454 como outer
- Vía 452728455 como outer
- Vía 393051949 como inner
- Vía 393051925 como inner
- Vía 393051910 como inner
- Vía 393051887 como inner
- Vía 393051912 como inner
- Vía 393051920 como inner
- Vía 393051933 como inner
- Vía 393051904 como inner
- Vía 393051942 como inner
- Vía 393051906 como inner
- Vía 393051939 como inner
- Vía 393051884 como inner

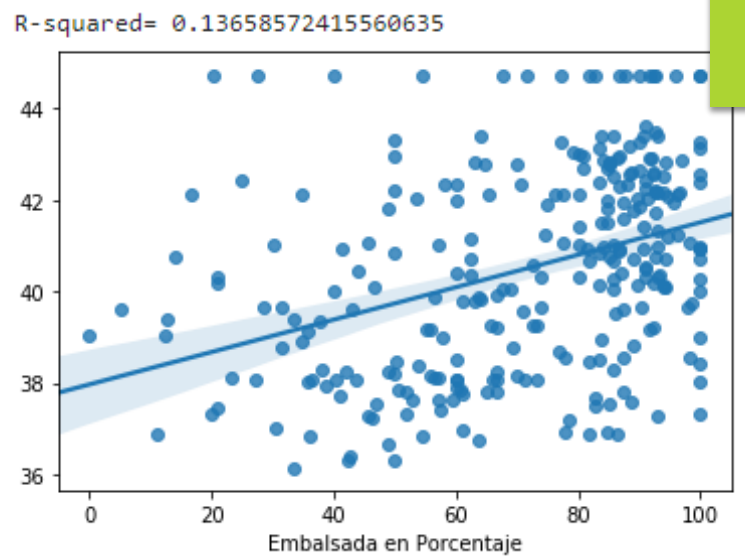


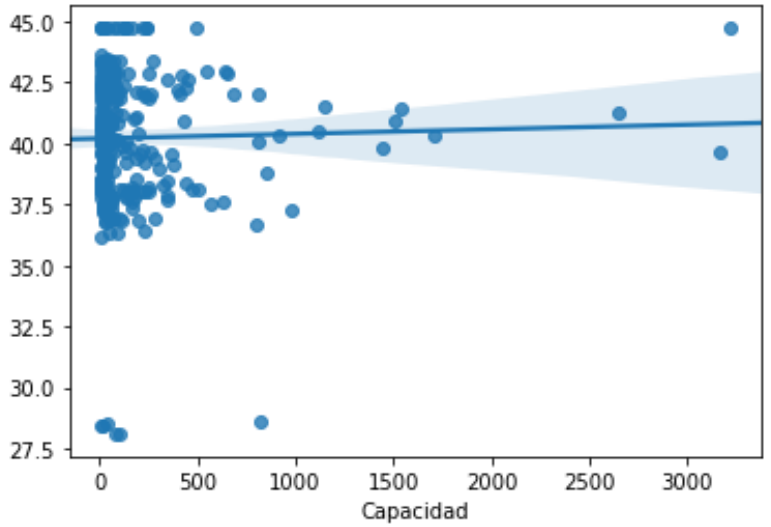
Results

- To the right we can find a screenshot of the interactive map developed.
- It shows the reservoirs highlighted according to their relative level of reserves.

Other results:

- R-squared between Latitude and relative reserves is very small suggesting very weak correlation. (Top).
- Correlation between built capacity and latitude nonexistent. No pattern in this distribution





Discussion and Conclusion

- The tool has room for improvement (see image to the right). However, time consuming and out of the project scope.
- Source databases used are incomplete.
- I am overall happy with the result and the tool satisfies it's purpose.