

Relationships between the level of provincial Human Development Index and the type of venues of a province

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Introduction

Human Development Index (HDI) is a composite indicator that shows the level of development according to human life standards. The index is calculated by three main factors: income, education and health. While the Foursquare API allows you to explore the type of venues along with its respective ranking that exists in a certain location. Our objective is to find a relationship between the type of venues with the HDI.

BUSINESS PROBLEM

The potential problem identified is finding if there is a relationship between the types of places and their development indices to have information that helps better urban planning and infrastructure investment.



Data

HID

The Human Development Index by province developed by UNDP in the Dominican Republic.
Source: <http://bit.ly/3bb3EQL>

FOURSQUARE

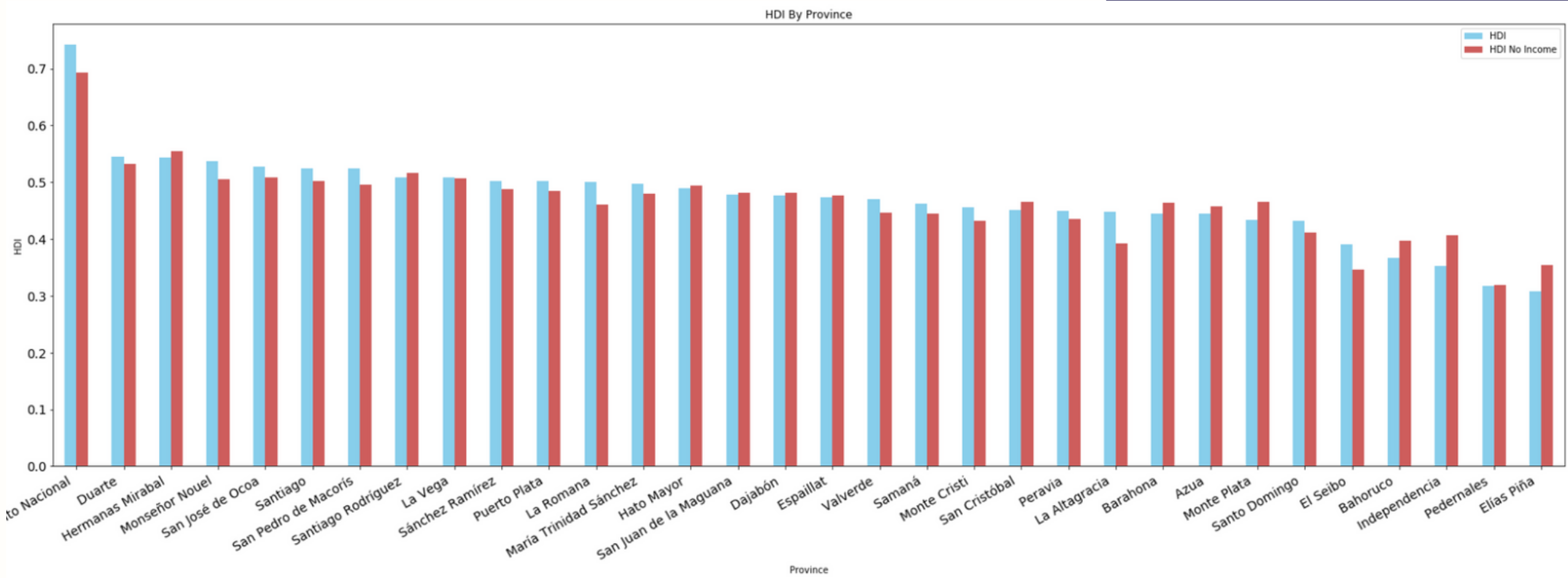
With the Foursquare api we will obtain the information of the places plus their category.
Source: <http://bit.ly/2UIDTq3>

WIKIPEDIA

From Wikipedia we are going to obtain population and density of the province.
Source: <http://bit.ly/3bbV1oL>

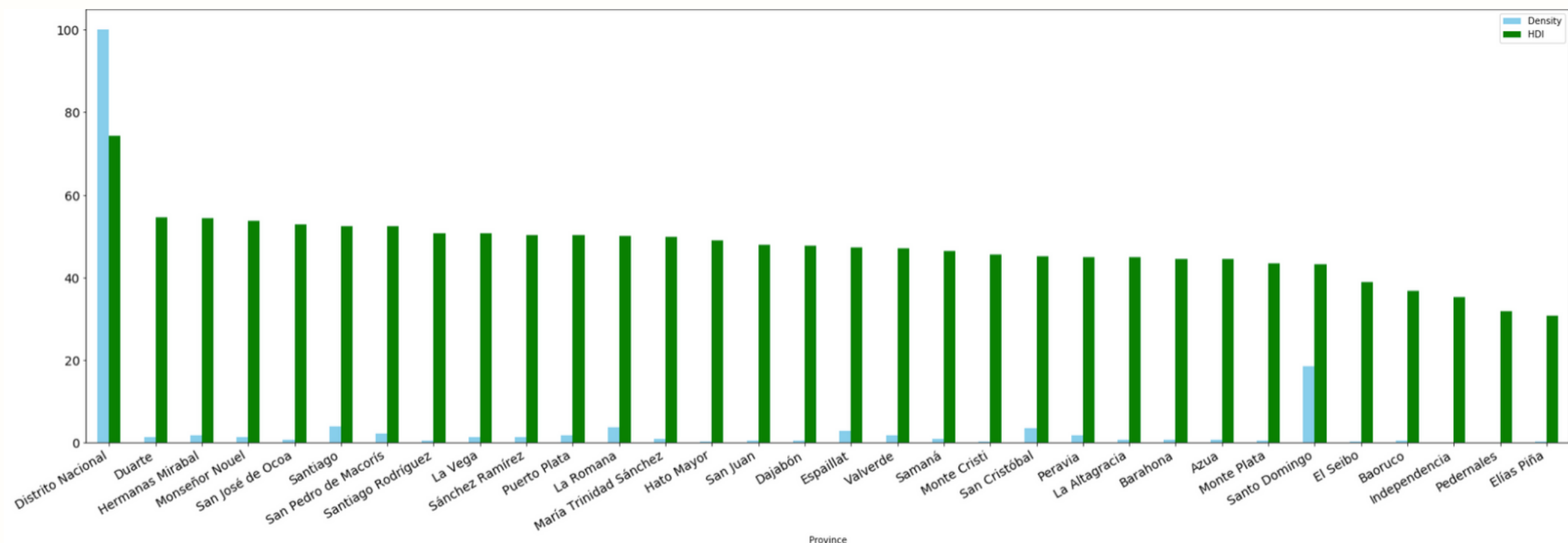
GOOGLE MAPS

With the Google Maps library we will obtain the lat & lng information for each province.

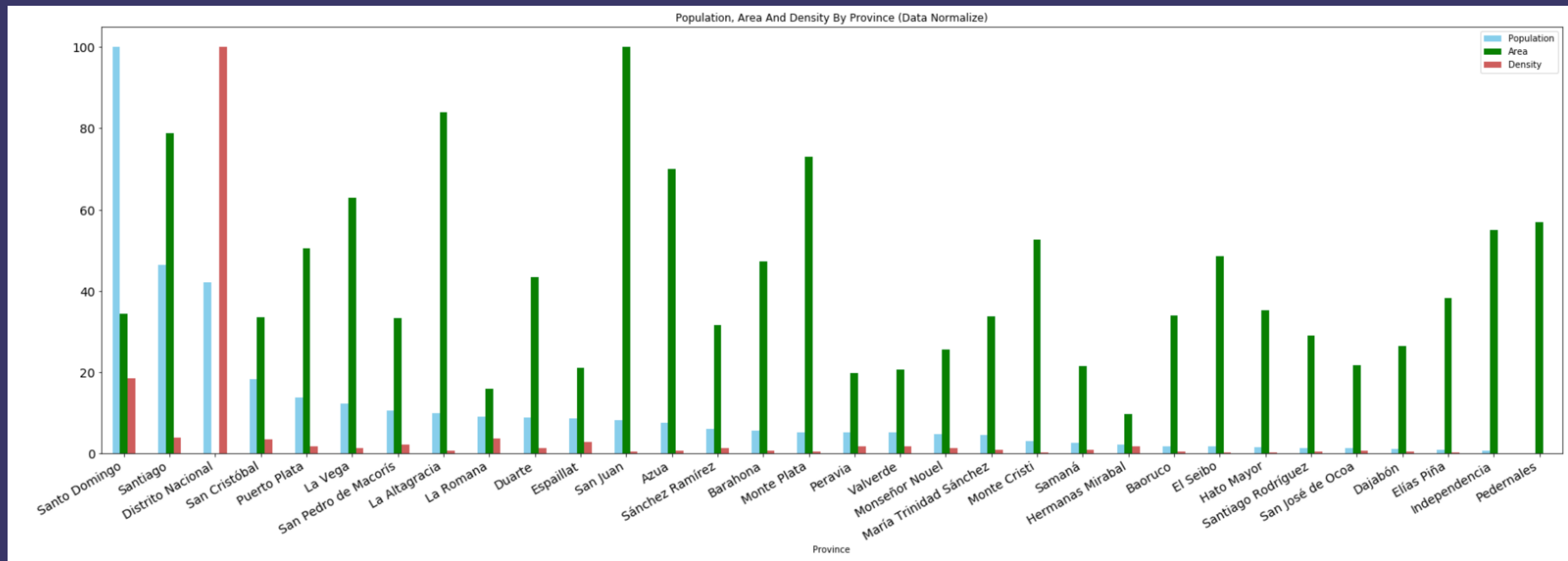


WE USE HDI AND ITS COMPONENTS (INCOME, HEALTH AND EDUCATION) AS COMPARISON MEASURES

	Province	HDI	Health Index	Education Index	Income Index
0	Azua	0.445	0.497	0.420	0.421
1	Bahoruco	0.367	0.501	0.315	0.312
2	Barahona	0.445	0.555	0.388	0.409
3	Dajabón	0.476	0.511	0.454	0.466
4	Distrito Nacional	0.742	0.774	0.620	0.853
5	Duarte	0.545	0.598	0.474	0.572
6	El Seibo	0.390	0.431	0.277	0.496
7	Elías Piña	0.308	0.499	0.252	0.232
8	Españillat	0.473	0.476	0.476	0.468
9	Hato Mayor	0.490	0.546	0.446	0.482
10	Hermanas Mirabal	0.544	0.628	0.489	0.526
11	Independencia	0.353	0.466	0.356	0.266
12	La Altagracia	0.448	0.379	0.406	0.583
13	La Romana	0.501	0.473	0.449	0.593
14	La Vega	0.508	0.524	0.489	0.511
15	María Trinidad Sánchez	0.498	0.522	0.442	0.536

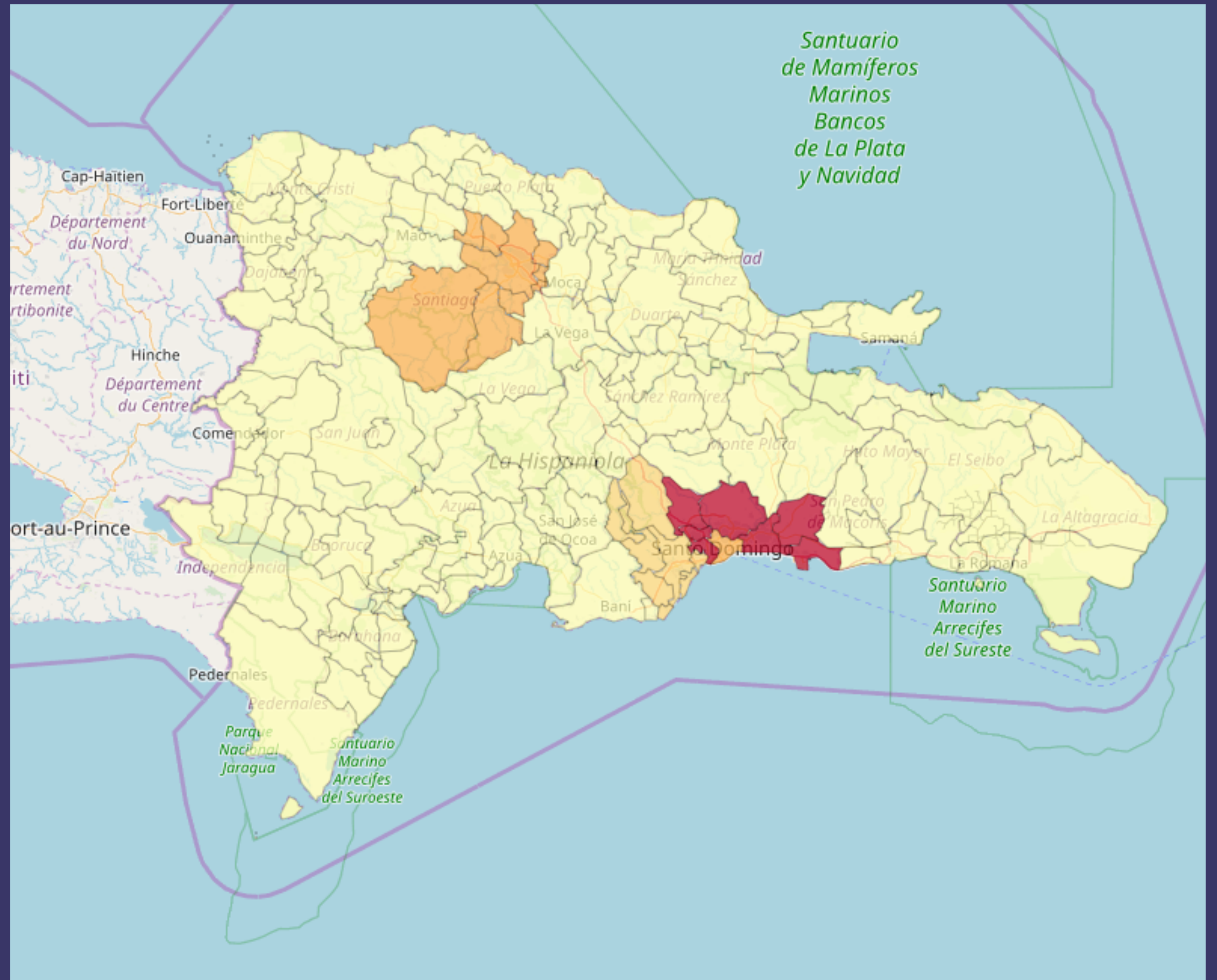


Outside the Distrito Nacional (capital of the country) whose population density is much higher than that of the rest of the provinces, we did not find a relationship between the density and its HDI.

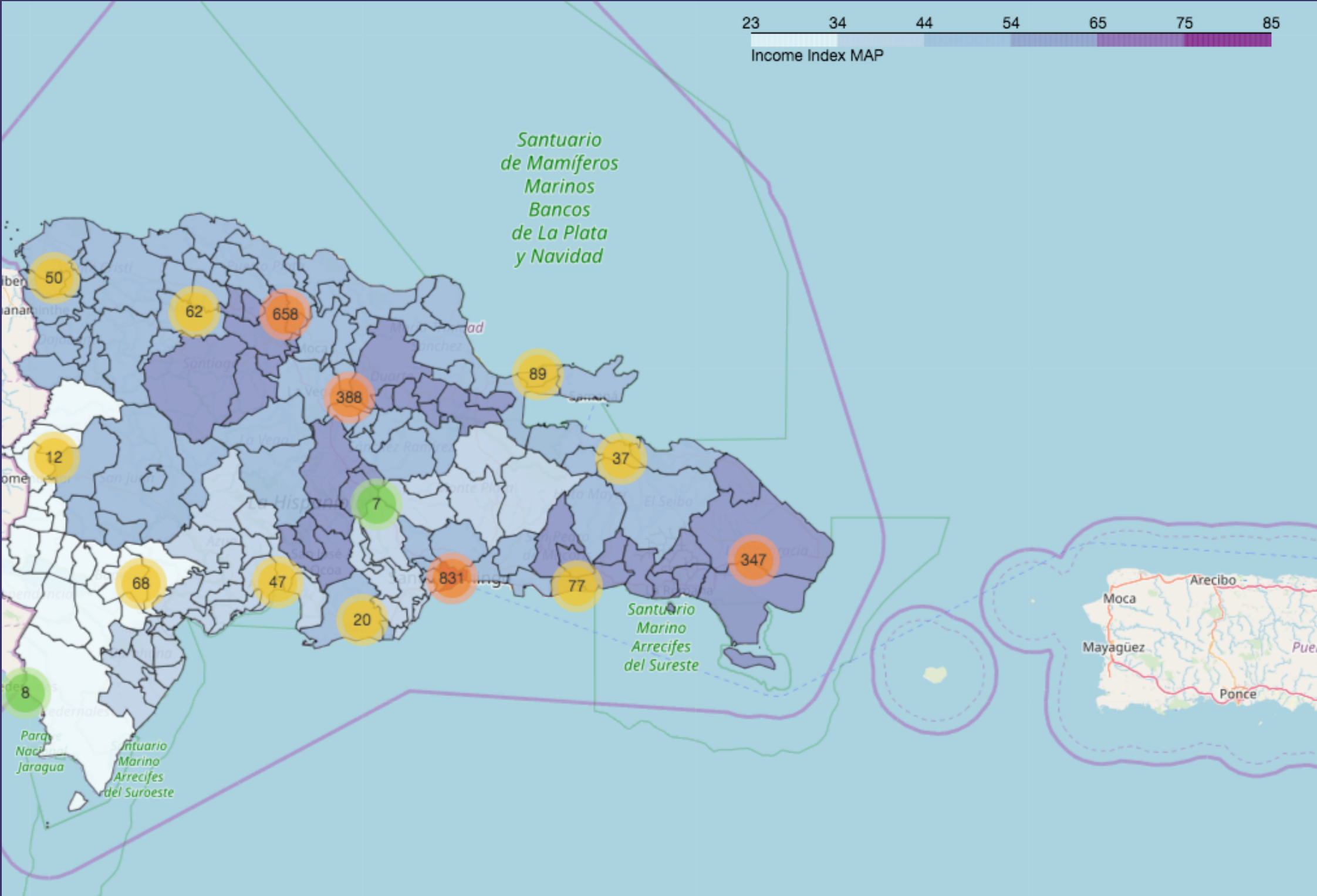


THERE IS A POOR DISTRIBUTION IN THE NATIONAL TERRITORY, WITH THE PROVINCES WITH THE HIGHEST POPULATION DENSITY HAVING THE LEAST GEOGRAPHICAL AREA BUT PERHAPS THE HIGHEST INDUSTRIAL CONCENTRATION.

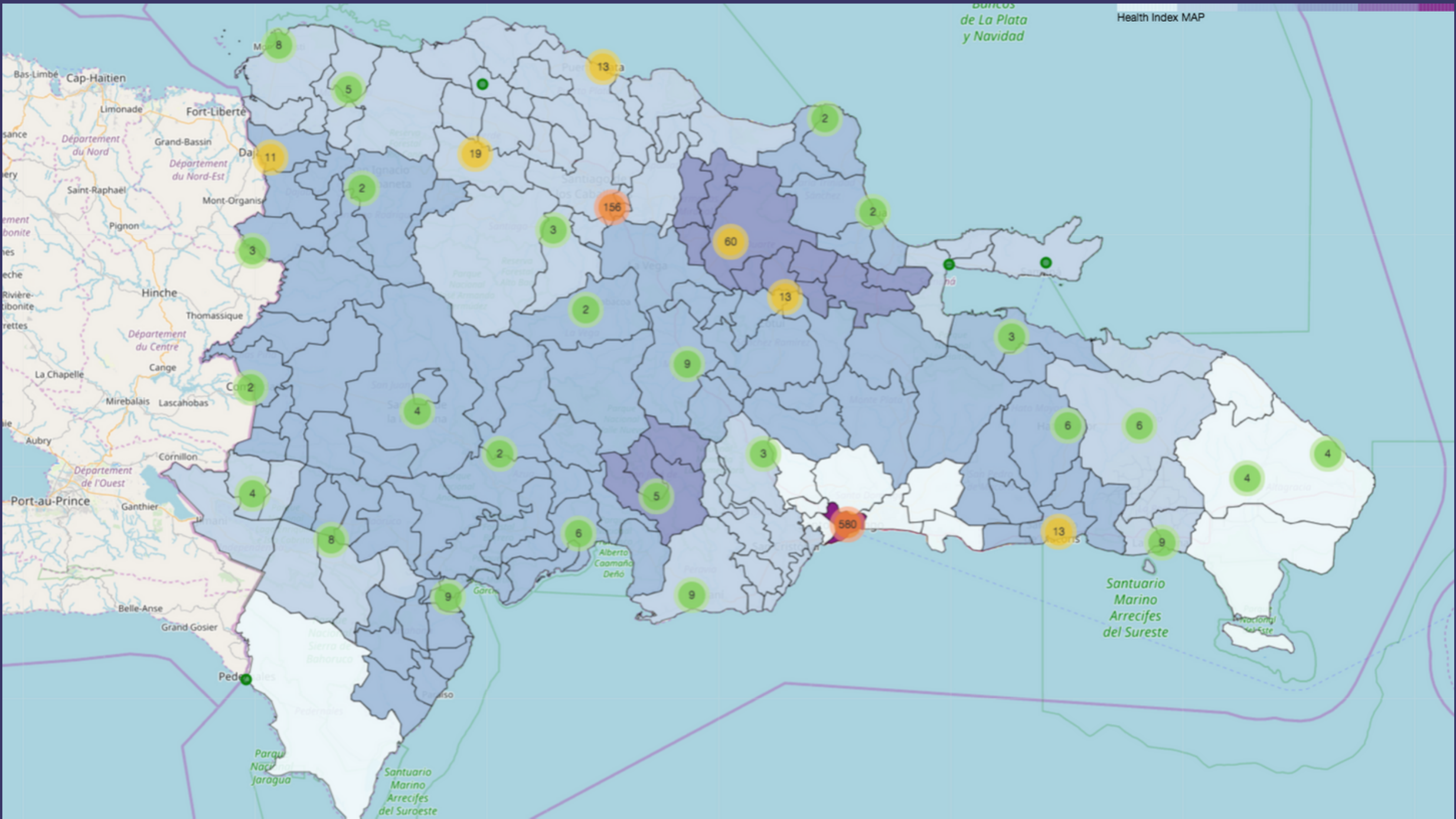
POPULATION DENSITY CHOROPLETH MAP



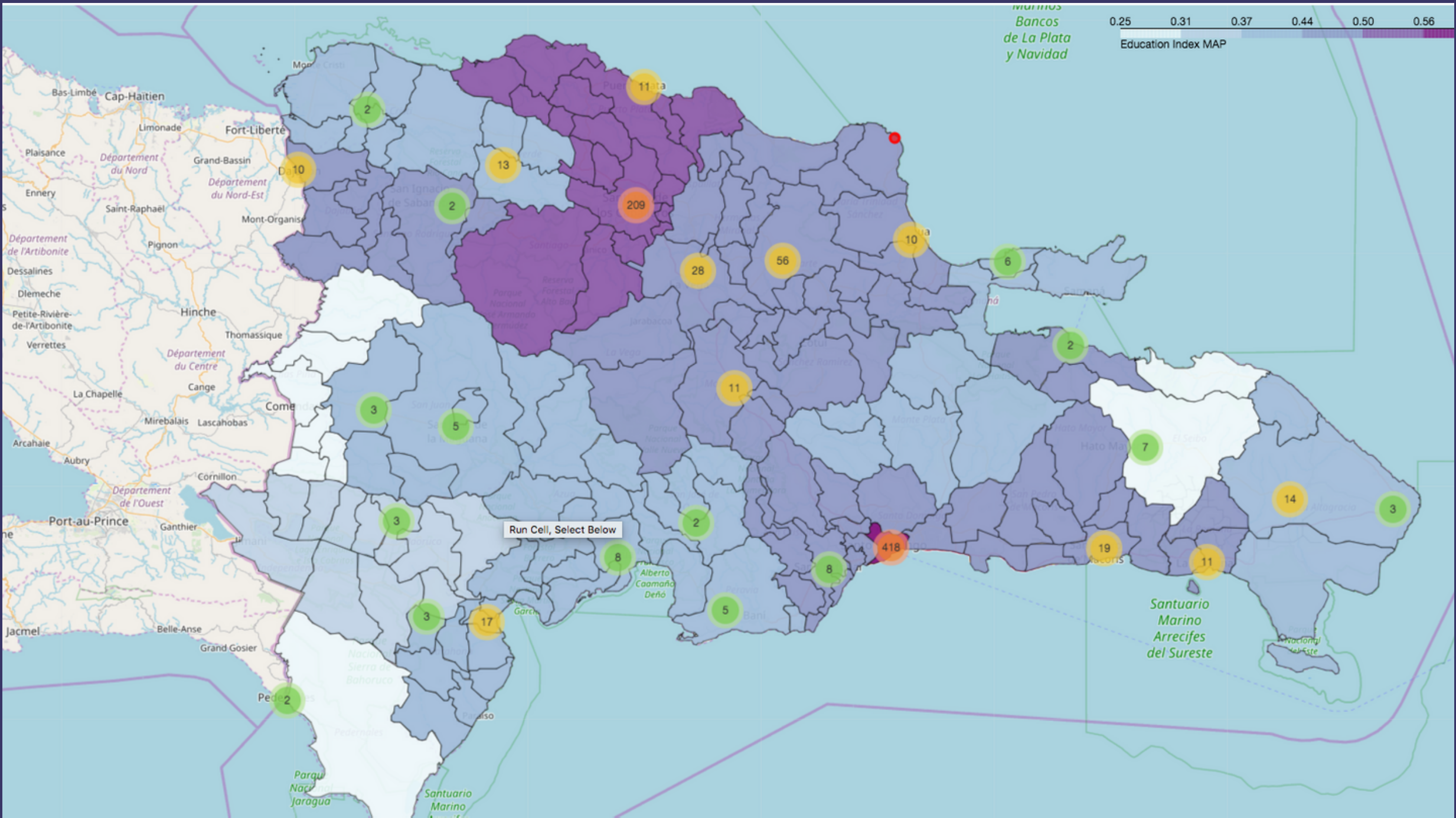
MAP FOR INCOME
INDEX WITH
SHOPPING VENUES
(CLUSTER)



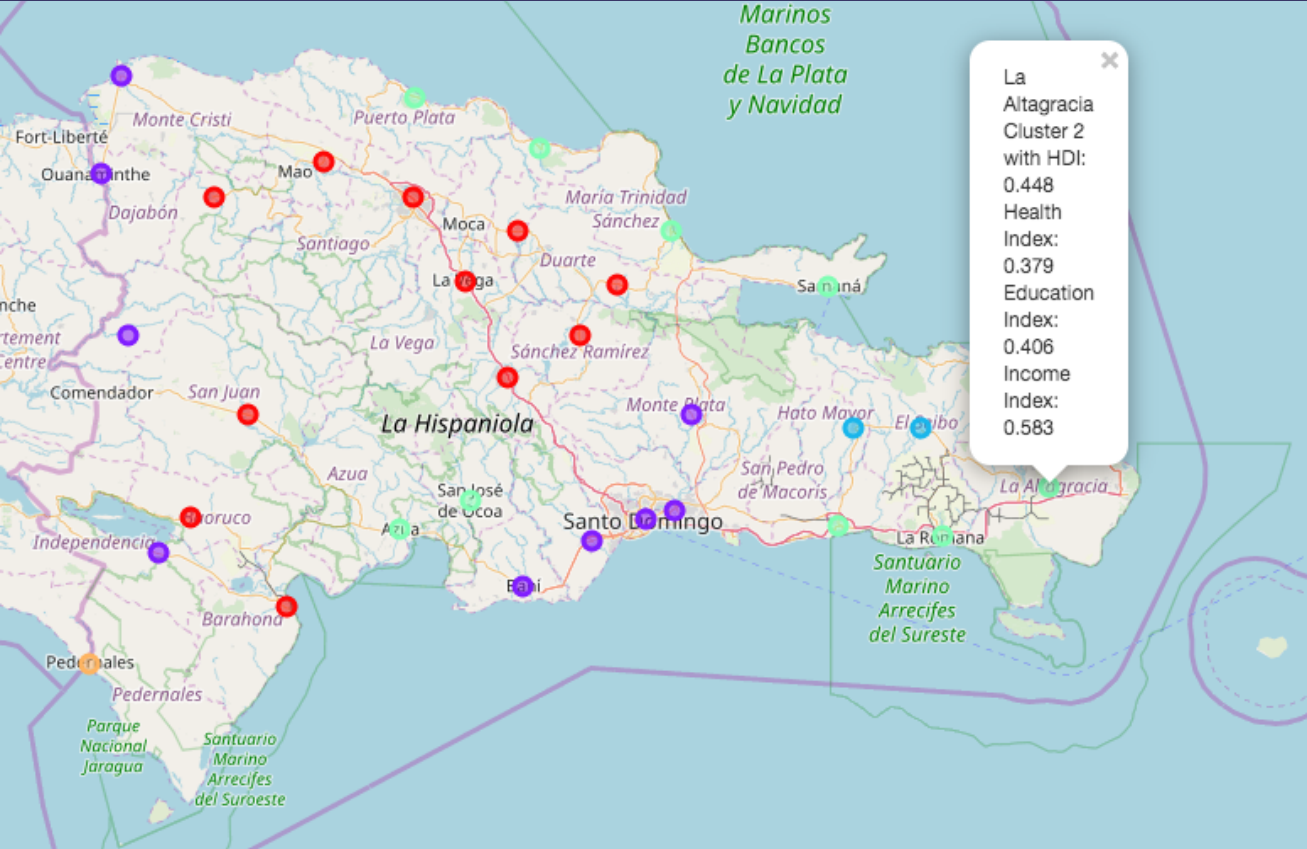
MAP FOR HEALTH
INDEX WITH
HEALTH VENUES
(CLUSTER)



MAP FOR
EDUCATION INDEX
WITH EDUCATION
VENUES (CLUSTER)

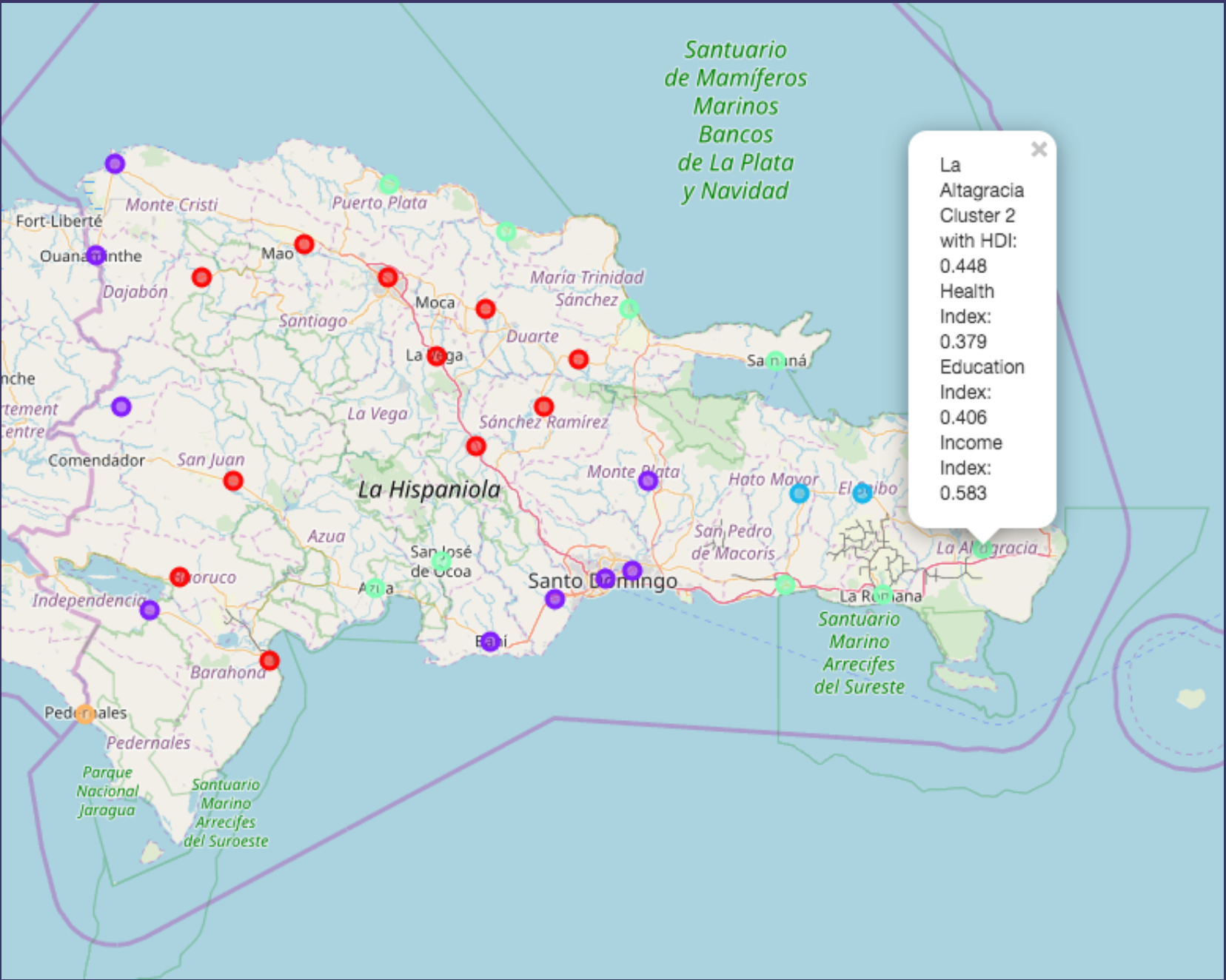
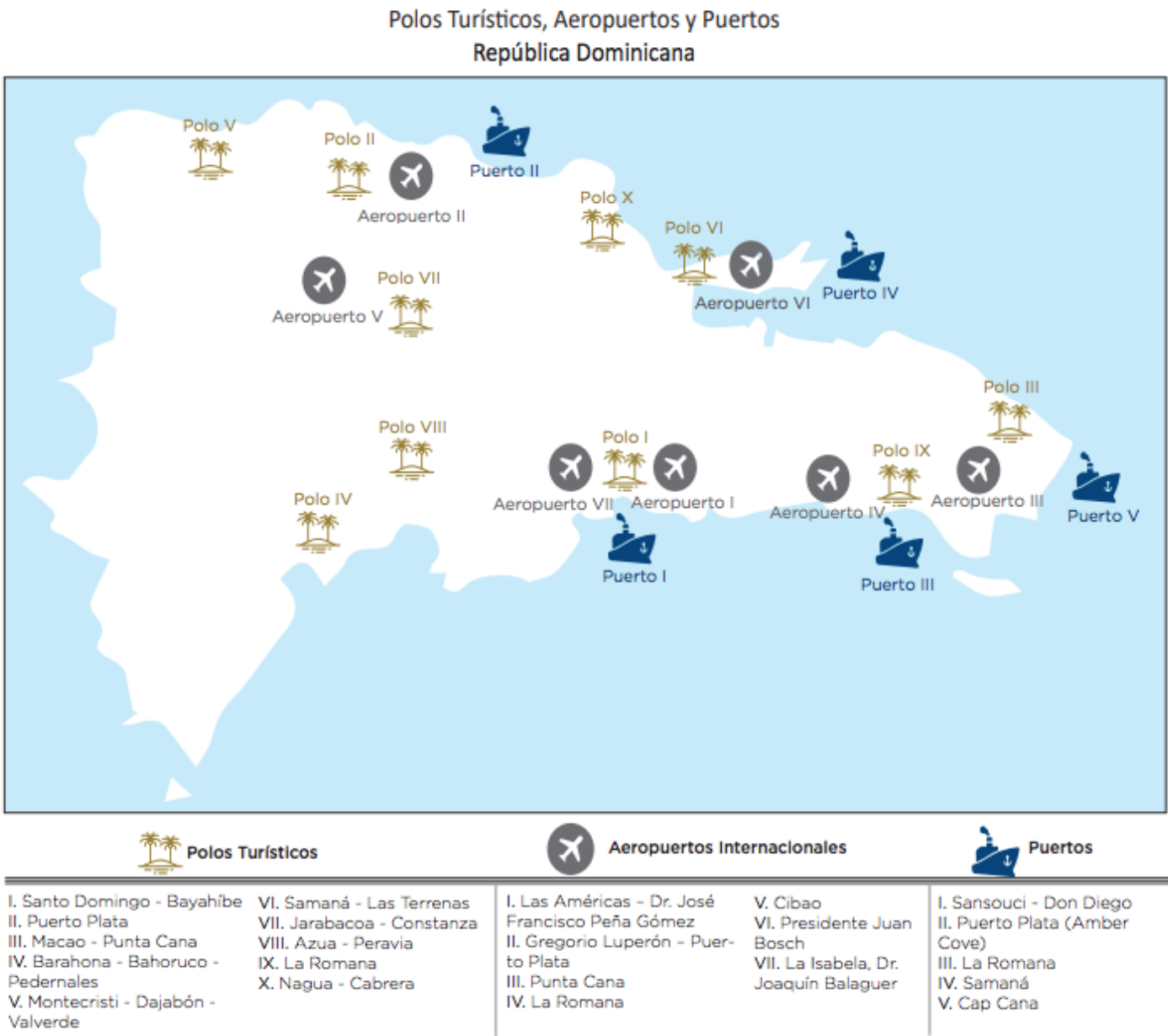


OUR FIRST CLUSTER USING ALL VENUE CATEGORY

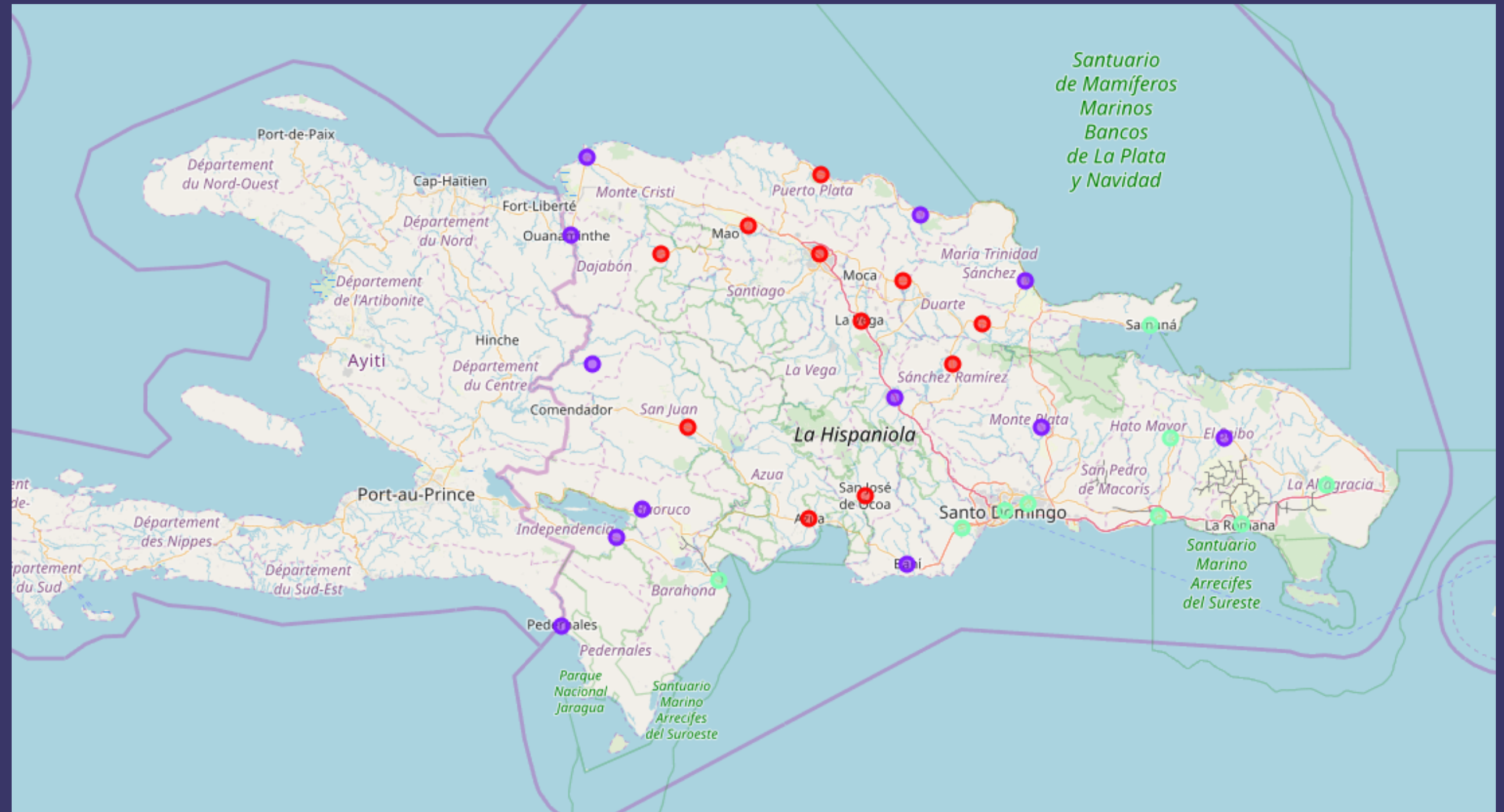


Province	1st Popular venue	2nd Popular venue	3rd Popular venue	4th Popular venue	5th Popular venue	6th Popular venue	7th Popular venue	8th Popular venue	9th Popular venue
Azua	Park	Seafood Restaurant	Supermarket	Restaurant	Student Center	Caribbean Restaurant	Boutique	Mobile Phone Shop	Burger Joint
Baoruco	Park	Restaurant	Hospital	Pharmacy	Fried Chicken Joint	High School	College Classroom	French Restaurant	Community College
Barahona	Park	Student Center	Liquor Store	Trade School	Clothing Store	Hospital	University	College Academic Building	Caribbean Restaurant
Dajabón	Hospital	Clothing Store	Park	Accessories Store	Electronics Store	Supermarket	Mobile Phone Shop	Community College	Market
Nacional	Hospital	Park	High School	Supermarket	College Academic Building	Clothing Store	University	Shopping Mall	Department Store
Duarte	Hospital	Park	College Academic Building	Clothing Store	Boutique	Pizza Place	Seafood Restaurant	Shopping Mall	University
El Seibo	Park	Caribbean Restaurant	Department Store	High School	Hospital	Shoe Store	Seafood Restaurant	Boutique	Restaurant
Las Piñas	Hospital	Park	High School	Lawyer	Caribbean Restaurant	Cheese Shop	Cosmetics Shop	Market	Restaurant
Españillat	Restaurant	Italian Restaurant	College Academic Building	Pizza Place	Park	Clothing Store	Supermarket	Café	Breakfast Spot
Hato Mayor	Hospital	Department Store	Park	Caribbean Restaurant	High School	Fast Food Restaurant	Shoe Store	Burger Joint	Student Center
Manzanillo Mirabal	Hospital	Park	Restaurant	Shopping Mall	Pizza Place	Grocery Store	BBQ Joint	Fast Food Restaurant	Food Truck
Independencia	Park	Hospital	Restaurant	High School	Mobile Phone Shop	Snack Place	Fried Chicken Joint	Convenience Store	Community College
Altagracia	Shopping Mall	Restaurant	Gift Shop	Clothing Store	Seafood Restaurant	Buffet	Italian Restaurant	Breakfast Spot	Caribbean Restaurant
Romana	Italian Restaurant	Restaurant	Pizza Place	High School	Seafood Restaurant	Hospital	Boutique	Clothing Store	Fast Food Restaurant
La Vega	Hospital	Park	Shopping Mall	Restaurant	Department Store	College Academic Building	University	Grocery Store	BBQ Joint
Trinidad Sánchez	Seafood Restaurant	Restaurant	Pizza Place	Park	Italian Restaurant	Student Center	Boutique	College Academic Building	Shopping Mall

INTERESTINGLY, CLUSTER 2 HAS AN ALMOST PERFECT COINCIDENCE WITH THE MAIN TOURIST CENTERS OF THE DOMINICAN CENTRAL BANK.



REFINING OUR
CLUSTER USING ONLY
3 TYPE OF VENUES
(SHOPPING,
EDUCATION AND
HEALTH)



Results

We specified the algorithm to generate three groups. The provinces in each group are similar to each other in terms of the characteristics included in the dataset.

- Cluster 1: These are the provinces with the lowest economic activity in the country and its reflected in an HDI and Income Index.
- Cluster 2: These are provinces that have higher incomes than the rest of the country, among them we found La Altagracia, which has the most important tourist pole in the Caribbean, San Pedro de Macorís with its sugar mill, and the National District with the largest population density in the country and it concentrates more than 70% of economic activity.
- Cluster 3: These are provinces with an HDI similar to those of group 1 but, in their composition, they have a better balance between the Health Index, the Income Index and the Education Index.





CONCLUSION

We have concluded that there is a correlation between the density of the type of business and its corresponding index. In other words, in provinces with higher income, there is a greater number of shops (or vice-versa, we have an endogeneity issue). The ones with the higher level of education, there are a greater number of educational centers. Lastly, in those provinces with higher value for the health index, we encounter more hospitals or health centers.