**Report**

Should include the following chapters:

1. **Introduction** – Short introduction to the topic, ending with questions/working hypothesis to be addressed and objective (2 pages max.)

In this project we aim to explore **how agriculture practices have changed over time; and see how these changes of practices are related with changes in socio-economic indicators.** The source of data for this project comes from the INE database, a Portuguese database containing a volume of Portuguese census information. For our purposes we were interested in gathering information on the agricultural activities and socio-economic indicators. The INE database contains agricultural activities involving permanent, temporary, grassland crops and livestock grouped by ‘freguesia’ or town with data from the years 1989, 1999, 2009, and 2019. Each of these topics also included information on the the … (refer to table 1).

Futhermore, we wanted socio-economic indicators which we decided would be production values, education levels, and labor types and counts also grouped by each town in the 1989, 1999, 2009, and 2019 (refer to table 2). With information about both the agricultural activities happening in each town over the course of 40 years and information on how socio-economic conditions have changed over 40 years, we could demonstrate a lot about the changes that have taken place over time and make further predictions about how such practices have changed and relate to socio-economic factors. This information is both necessary and interesting to analyze given the environmental changes and socio-economic changes that have taken place in the last 40 years. The world is only becoming more fast-paced and more extreme environmental changes are taking place, because of this, farmers will need to adapt their practices. Conversely, at the beginning of this project we were under the assumption that socio-economic conditions have improved in our societies. Therefore this project acts as an interesting way to verify this assumption and look into what improved “socio-economic” conditions actually imply.

Specifically, the hypotheses we decided to test are:

1. The variety of agricultural practices have increased over time in each region.
2. The larger variety of agricultural practices, the more economic gain (in production\_euro) and the greater the labour force.
3. The more greater variety in ag practices, the greater the economic gain in production\_euro
4. **Database description** – Short descriptive statistics of the database/tables (2 page max.)

* **Discuss the INE database more**?
* **Discuss how the database was normalized in SQL and then uploaded as a csv file**

Table 1: Agricultural Activity Data

|  |  |
| --- | --- |
| Agricultural Activity | About |
| Agricultural holdings with permanent crops |  |
| Agricultural holdings with temporary crops (No.) | Cereals, Dried Pulses, Potatoes, Sugarbeets, Fresh vegetables, Flowers and Ornamental Plants, Industrial crops, Other temporary crops |
| Grassland crops |  |
| Livestock |  |

Table 2: Socio-Economic Indicator Data

|  |  |
| --- | --- |
| **Socio-Economic Indicator** | **About** |
| Production value (euro) | Value of total standard production of agricultural holdings (in euro) |
| labour\_regular | Volume of agricultural labour force (AWU) and Type of labour force - Regular |
| Labour\_non\_regular |  |
| Labur not hired | Volume of agricultural labour force (AWU) and Type of labour force - Workers not hired by the holder |
| Labour family |  |
| Edu\_none |  |
| Edu\_ |  |
| Edu |  |

1. **Exploratory data analysis** – This will be the most important chapter, where you will try to tell a coherent history by means of numerical outputs and visualizations (10 pages max.)
   1. **Used histograms to get an idea of how the data is distributed**
   2. **Scatter plots to see where groups of data fall on temporal scale**
   3. PCA to see how data varies (some variance over time but not too much)
   4. Other ideas…
2. **Discussion/Conclusions** – a short discussion/main take home messages/conclusions of the work (2 pages max.).
3. **References**
4. **ANNEX – Python code.**