

# Data Analysis of Health Insurance in France

*Statistical data on the fees of liberal health professionals*

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# The Team



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M2 AIRE Digital Sciences



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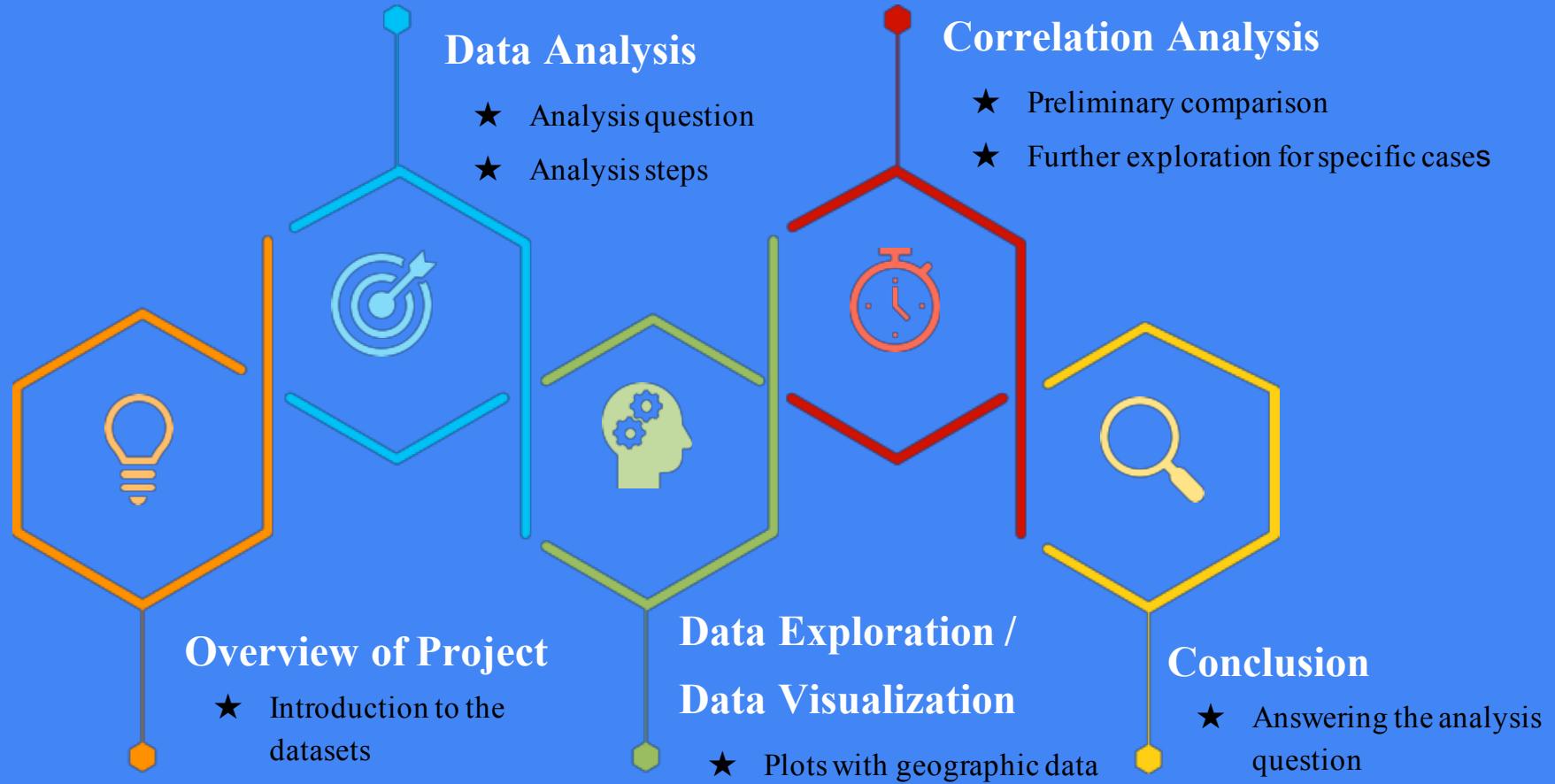
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# OUTLINE :



A close-up photograph of a person's hands resting on a laptop keyboard. The hands are positioned as if the person is about to type or has just finished. The background is blurred, showing what appears to be a colorful screen or a window with a view of the outdoors.

# PROJECT OVERVIEW

Understanding the datasets  
for analysis

# Overview of the Data

- **Datasets:**
  - Workforce and Density by Department
    - workforce, population, density of liberal health professionals
  - Total Fees of Health Professionals by Department
    - fees, fee overruns and annual travel expenses for all liberal health professionals
- **Scope:** Whole France (metropolitan and overseas) in 2018
- **Sources:**
  - Amos (Assurance Maladie offre de soins)
  - Snir (système national interrégimes)

# Health Professionals

## **Categories:**

- Specialists
  - Generalists and MEP
  - Dentists and ODF
  - Midwives
  - Medical auxiliaires
    - nurses, physiotherapists, pedicurists, speech therapists, orthoptists
  - Laboratoires
-

# Dataset 1: Workforce and Density by Department

- **Department**
- **Workforce - Effectif**
- **French Population**
- **Density / 100,000 habitants**

	Spécialistes	DEPARTEMENT	EFFECTIF	POPULATION FRANCAISE	DENSITE /100 000 hab.
0	02- Anesthésie-réanimation chirurgicale	01- Ain	18	653688.0	2.753607

Density = (Workforce/Population)\*100,000

# Dataset 2 : Total Fees of Health Professionals by Department

- **Department** - Département
- **Workforce** - Effectifs
- **Fees without Excess** - Honoraires sans dépassement
- **Exceeding Fees** - Dépassement
- **Travel Expenses** - Frais de dépassement
- **Total Fees** - Honoraires Totaux

Total Fees = Fees without excess + Exceeding fees + Travel expenses



# DATA ANALYSIS

To answer the proposed question, we use Python to explore and interpret the data through the following process.

# ANALYSIS QUESTION:

Can we establish *a link* between the density of physicians\* by specialty and by territory and the practice of exceeding fees?

# ANALYSIS PROCESS :

Importing the  
Datasets in Python

Data Wrangling

Visualization

Interpretation

Grouping Data:

\* Speciality \* Region

Filtering Data

\* specialists > 11 effectifs

	Spécialité	Spécialistes
0	Spécialistes	TOTAL MEDECINS
1	Spécialistes	TOTAL SPECIALISTES
2	Spécialistes	02- Anesthésie-réanimation chirurgicale
3	Spécialistes	03- Pathologie cardio-vasculaire
4	Spécialistes	04- Chirurgie générale
...	...	...
135	Dentistes et ODF	TOTAL CHIRURGIE DENTAIRE (19, 36, 53, 54)
136	Laboratoires	30- Laboratoires

	DEPARTEMENT	REGION
0	01- Ain	Auvergne-Rhône-Alpes
1	02- Aisne	Nord-Pas-de-Calais-Picardie
2	03- Allier	Auvergne-Rhône-Alpes
3	04- Alpes-Hte-Provence	Provence-Alpes-Côte d'Azur
4	05- Hautes-Alpes	Provence-Alpes-Côte d'Azur
...	...	...
96	971- Guadeloupe	Guadeloupe
97	972- Martinique	Martinique

To avoid this

	Spécialistes	DEPARTEMENT	EFFECTIFS	DEPASSEMENTS (Euros)
3	02- Anesthésie-réanimation chirurgicale	04- Alpes-Hte-Provence	4	nc
4	02- Anesthésie-réanimation chirurgicale	05- Hautes-Alpes	6	nc
7	02- Anesthésie-réanimation chirurgicale	08- Ardennes	6	nc

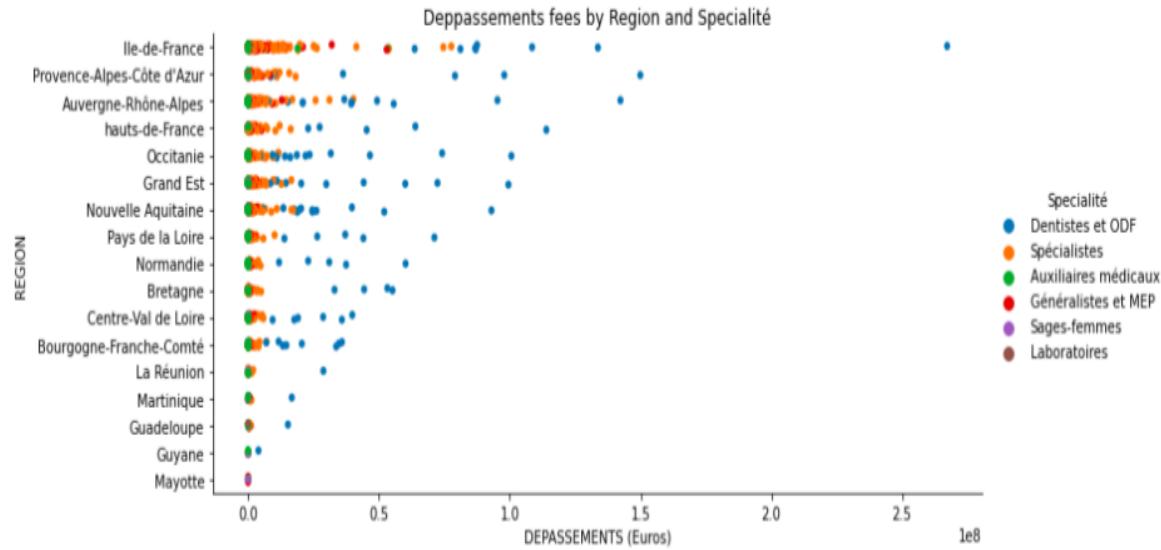


# DATA EXPLORATION

Overview of the relations between the density of physicians by speciality and by regions, and the practice of exceeding fees

# Exceeding Fees by Regions and Specialties

## Visualization



- In each region we see a tendency that the top **2 specialties** (**Dentists** and **Specialists**) have higher exceeding fees than other specialties.

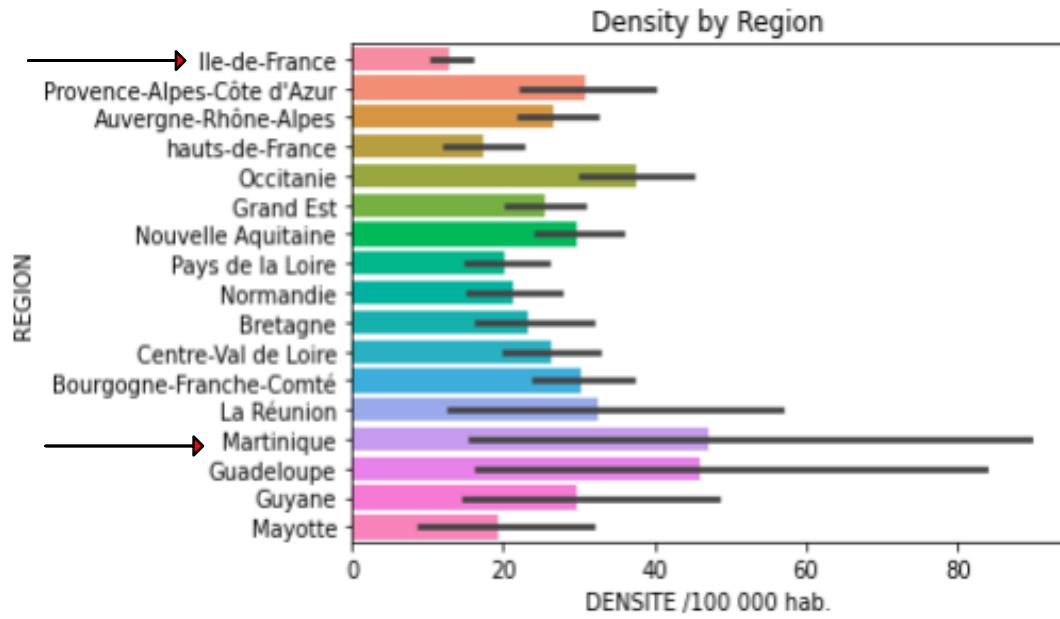


## Interpretation

# Health Professionals Density by Regions

## Visualization

## Interpretation



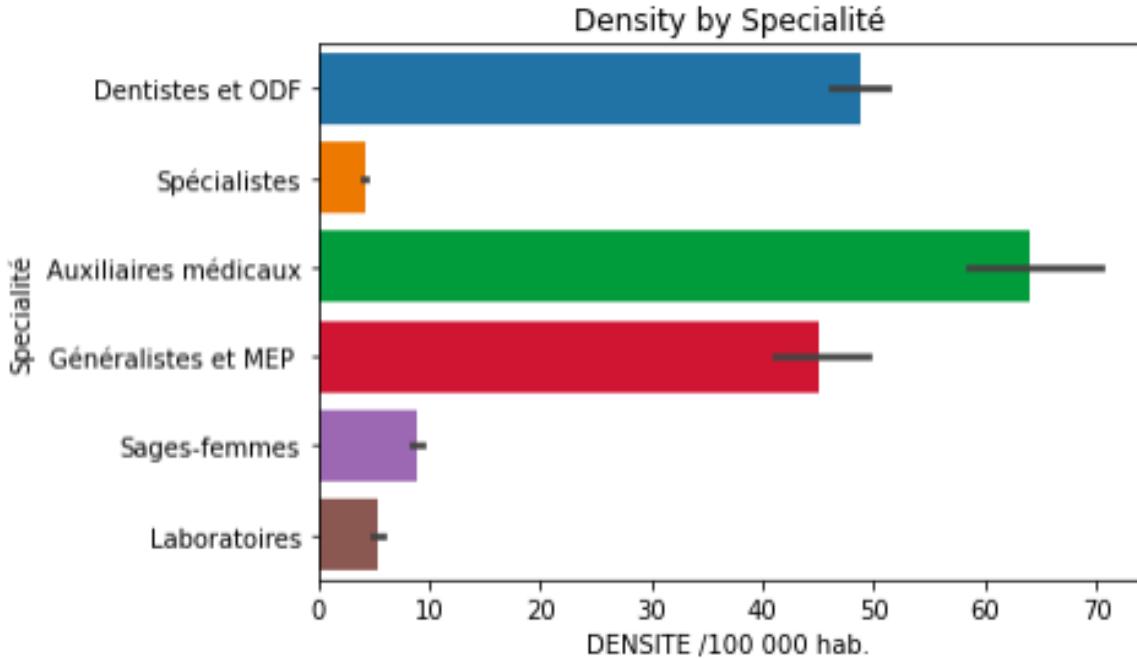
- **Ile-de-France** is the region with the highest exceeding fees, but its density is the lowest.
- **Martinique** and **Guadeloupe** have low exceeding fees but the highest density.



# Density by Healthcare Specialties

## Visualization

## Interpretation



2 noteworthy specialties :

- **Paramedic** (Auxiliaires médicaux) have a very high density
- **Specialists** have the lowest density



# Specialities Ranked by Exceeding Fees / Density

## Visualization

Spécialité	EFFECTIFS	DEPASSEMENTS (Euros)	POPULATION FRANCAISE	DENSITE /100 000 hab.
Dentistes et ODF	349.120000	4.194006e+07	6.672233e+05	48.745788
Spécialistes	40.452621	2.448603e+06	1.038449e+06	4.179538
Généralistes et MEP	308.760925	1.265176e+06	8.369204e+05	45.146767
Auxiliaires médicaux	424.311547	2.286952e+05	7.015549e+05	64.076763
Sages-femmes	64.365591	4.966296e+04	7.052445e+05	8.909656
Laboratoires	46.946667	6.622410e+03	8.443845e+05	5.350645

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Laboratoires	46.946667	6.622410e+03	8.443845e+05	5.350645
Spécialistes	40.452621	2.448603e+06	1.038449e+06	4.179538

## Interpretation

- Dentists have the highest exceeding fees with a high density.
- Spécialistes have high exceeding fees whereas their density is the lowest.
- Medical auxiliaries have the low exceeding fees but with highest density.

# CORRELATION ANALYSIS



## Dentist

- high exceeding fees / high density



## Specialists

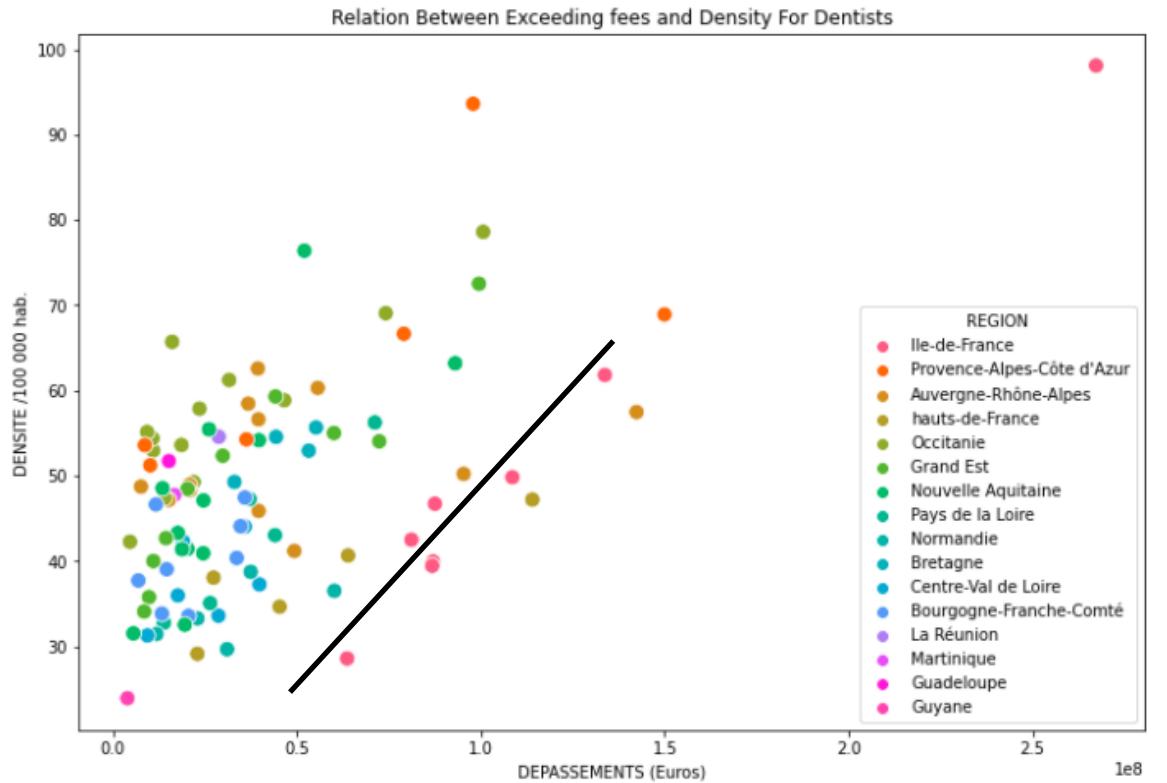
- high exceeding fees / low density



## Medical auxiliaries

- low exceeding fees / high density

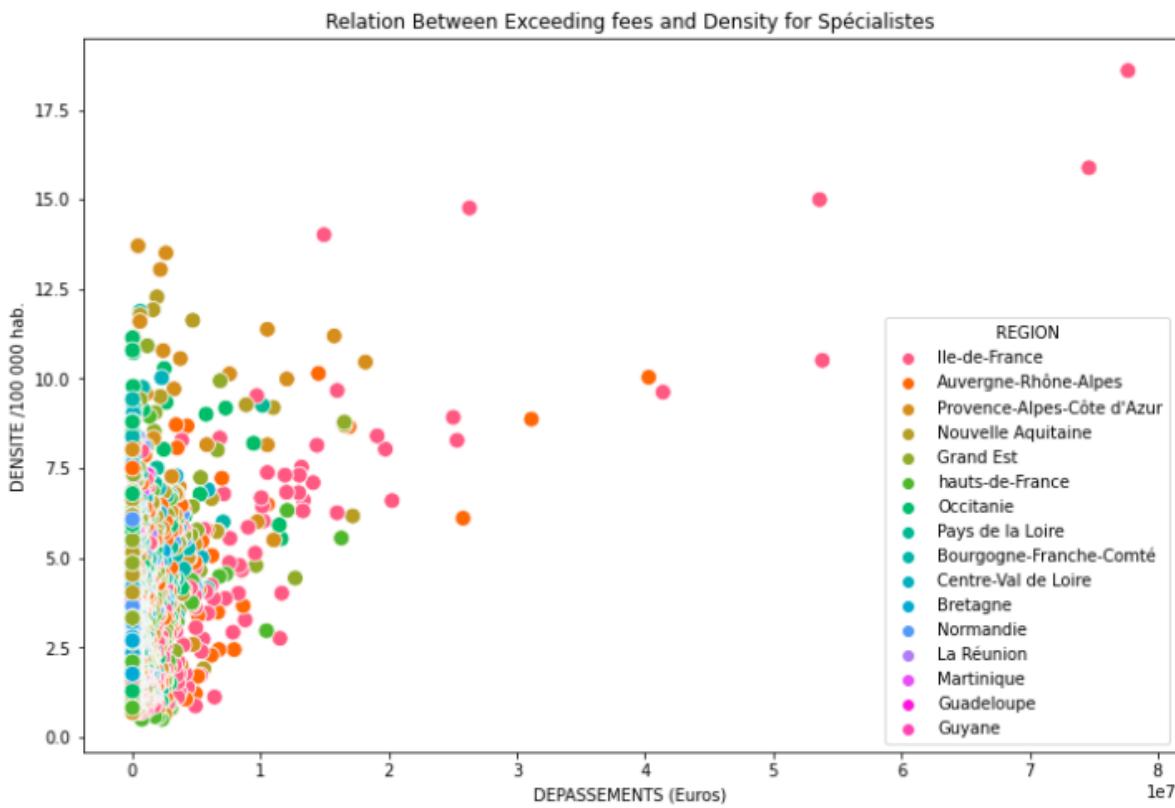
# Correlation between exceeding fees & density for the dentists



- A moderate positive correlation (corr coefficient = **0.55**)
- In specific regions strong correlations.



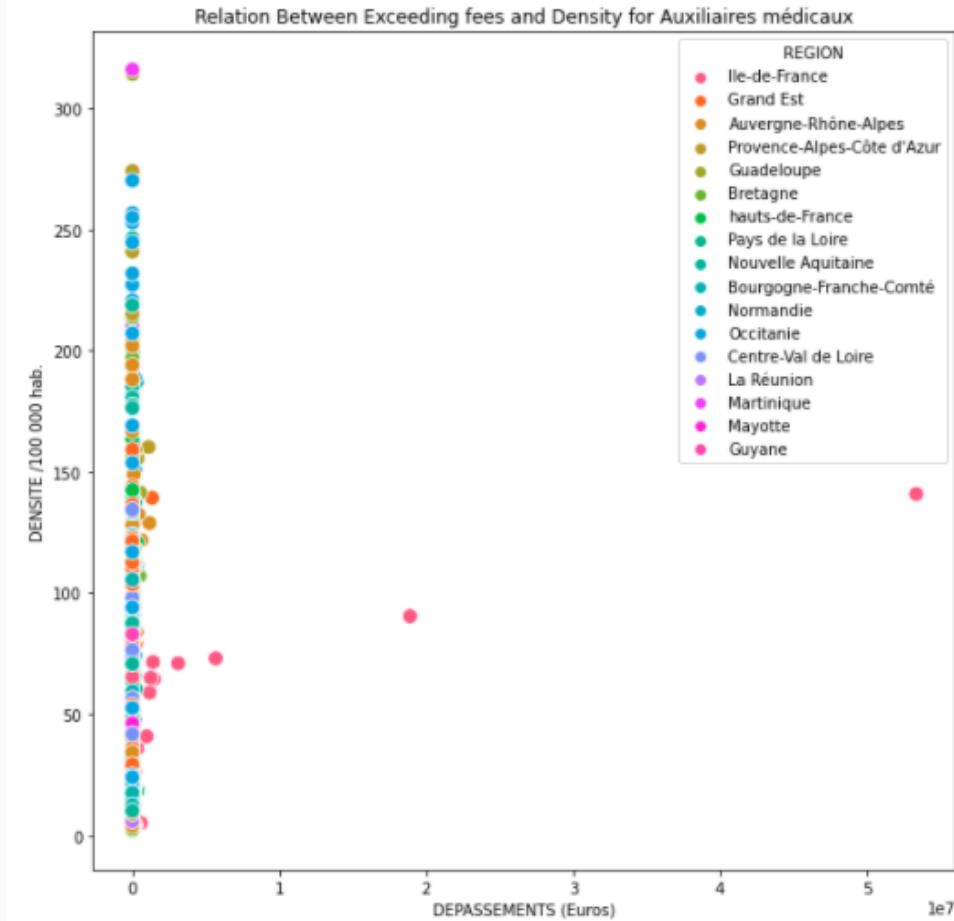
# Correlation between exceeding fees and density for the specialists



- NO correlation in general from graph
- a weak correlation (corr coefficient = 0.42) from correlation table



# Correlation between exceeding fees and density for the medical auxiliaries



- NO correlation from graph and no correlation (corr coefficient = **0.06**) from correlation table



# CORRELATION ANALYSIS FOR SPECIFIC CASES



- Île de France
  - High exceeding fees
  - Low density



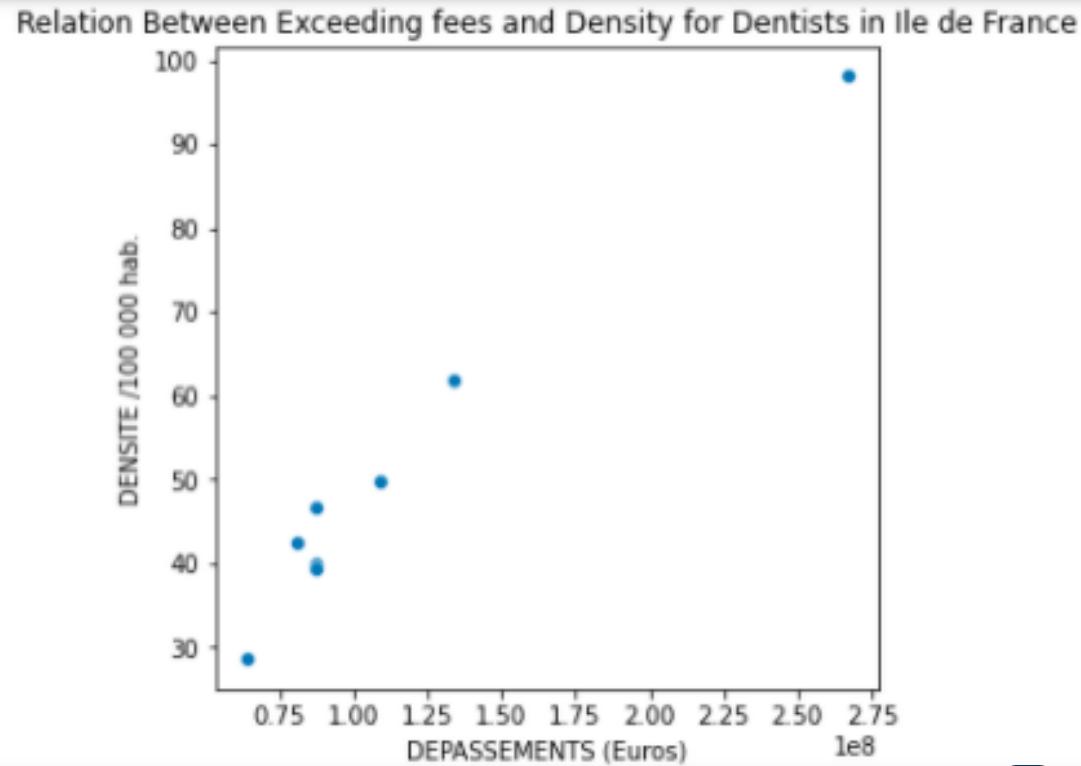
- Martinique & Guadeloupe
- Low exceeding fees
  - High density



# Correlation between exceeding fees and density for the dentists

## Visualization

## Interpretation



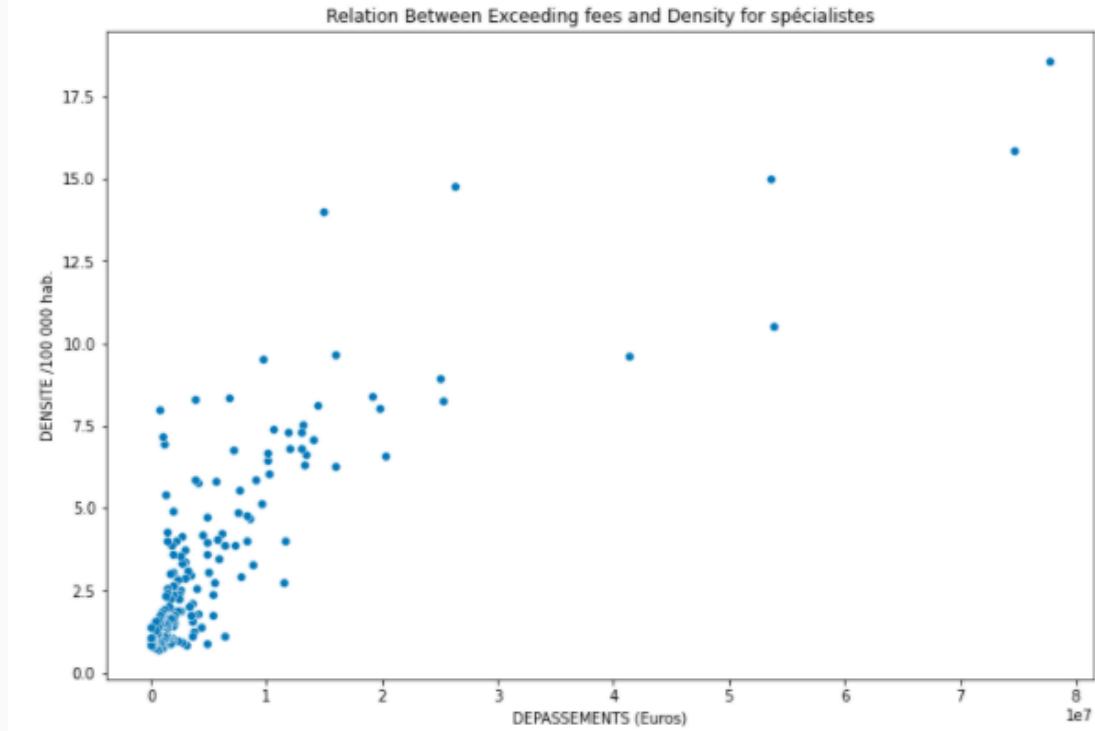
- Strong positive correlation (corr coefficient = **0.98**).
- The more dense of the dentists, the more exceeding fees.



# Correlation between exceeding fees and density for the specialists

## Visualization

## Interpretation



- There is a positive correlation (corr coefficient = **0.81**) with lots of outliers.



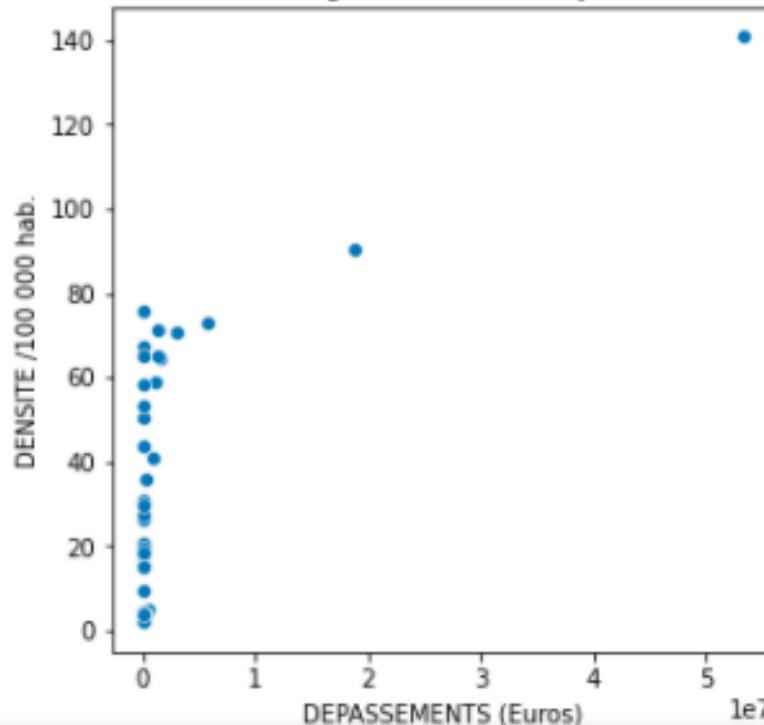
# Correlation between exceeding fees and density for the medical auxiliaries

# Visualization

# Interpretation



## Relation Between Exceeding fees and Density for Auxiliaires médicaux



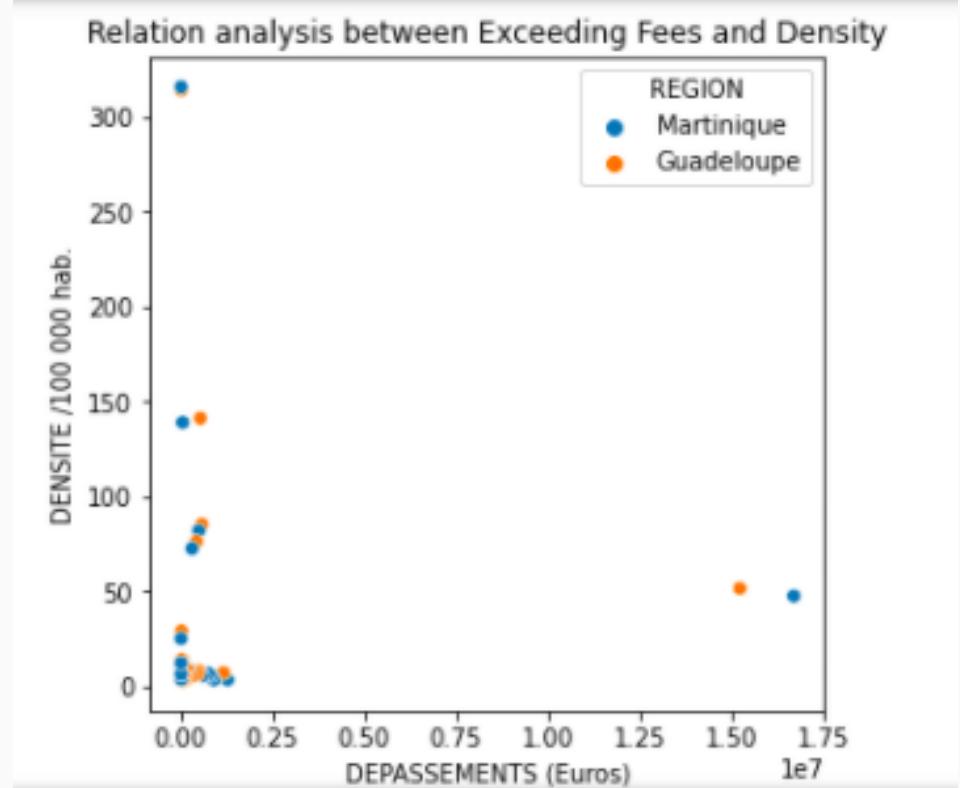
- There is almost NO exceeding fees in the field of medical auxiliaries so there is no possible correlation.



# Correlation between exceeding fees and density for Martinique and Guadeloupe

## Visualization

## Interpretation



- There is no relation (corr coefficient < **0.01**) between exceeding fees and density in Martinique & Guadeloupe.

# CONCLUSIONS



# Results of Region Analysis

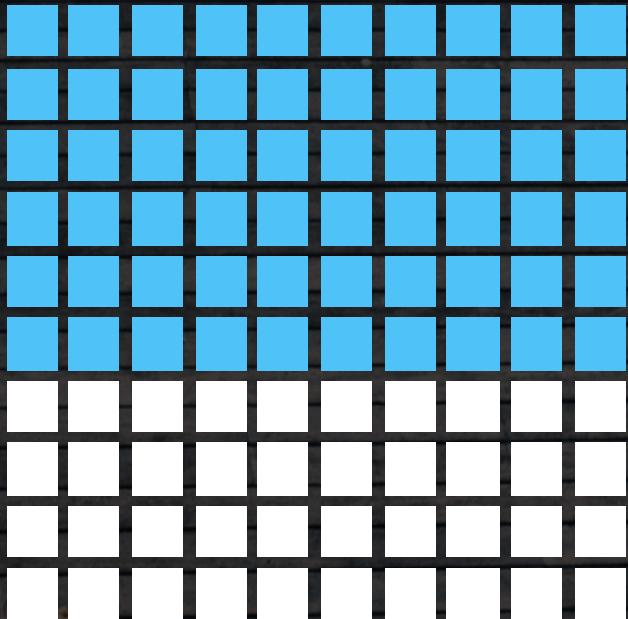
- **Ile de France** → high exceeding fees / low density
  - A significant **positive** correlation between exceeding fees and density for the dentists and the specialists, **NOT** for the medical auxiliaries.
- **Martinique & Guadeloupe** → low exceeding fees / high density
  - **NO correlation** between exceeding fees and density

# Results of Specialty Analysis

- **Dentists** → high exceeding fees / high density
  - A high **positive** correlation between exceeding fees and density
- **Specialists** → high exceeding fees / low density
  - A **positive** correlation between exceeding fees and density
- **Medical auxiliaries** → low exceeding fees / high density
  - **NO** correlation between exceeding fees and density

# CONCLUSION:

- In general, there is **NO** strong link between exceeding fees and density. However, we found some correlations when we specifically analyse by '**top**' specialities.
- **Dentists & Specialists** specialities are the top two in exceeding fees in comparison to other specialities, especially in **Ile de France, Martinique & Guadeloupe**.





# Questions



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