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VIRTUAL GLOBAL HACKATHON UNTITLED.PY

Category:
Data Analysis

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THE PROBLEM

Tackling unemployment of women and immigrants in the most populated districts in Barcelona.

THE BACKGROUND

Barcelona has struggled with unemployment since the 2008 financial crisis, largely due to long working hours and low productivity. Unpaid overtime work and strenuous, laborious tasks further discourage people from joining the workforce. Uber also faces problems such as expansion and legal battles over local taxi regulations, making it difficult to attract both consumer demand and a steady supply of drivers.

DATA ANALYSIS

Eixample is the most heavily populated district in Barcelona due to its modern architecture and its dynamic lifestyle, including many luxury shopping areas and restaurants that locals frequently visit.

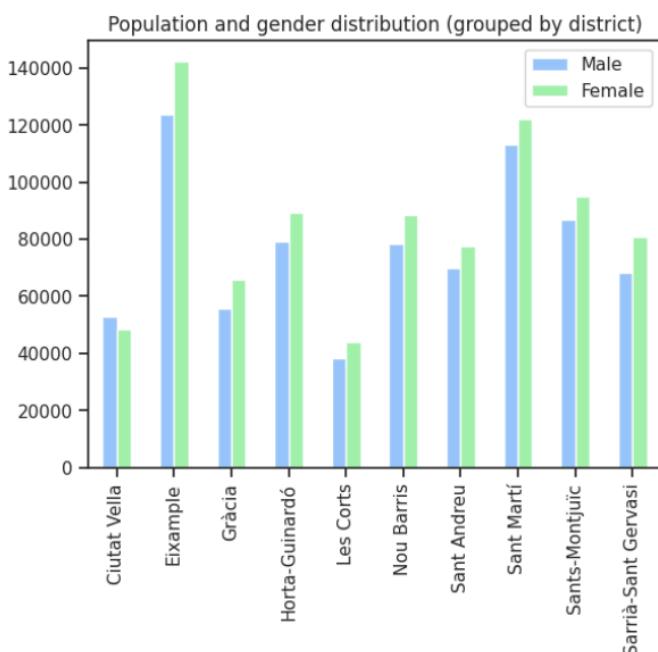


Fig. 1. Population and gender distribution of all districts

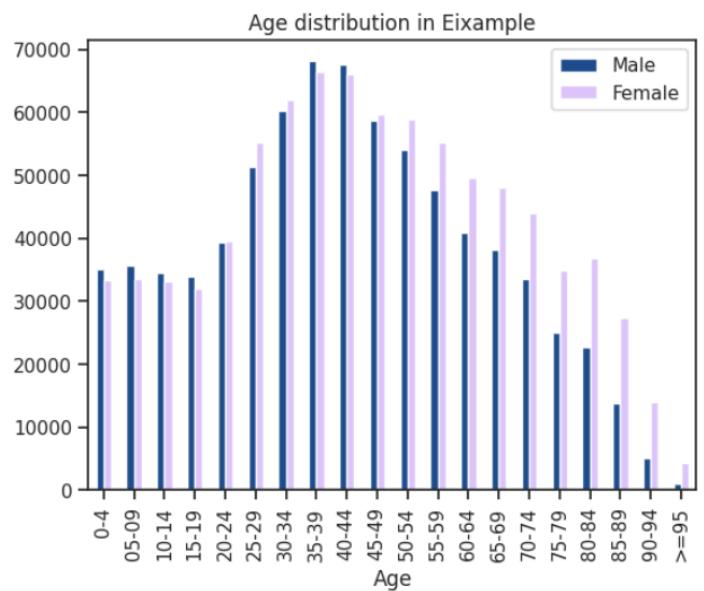


Fig. 2. Eixample's age distribution

As seen in Fig. 1, Eixample has the highest population among all districts, consisting of significantly more females than males. Fig. 2 displays signs of an ageing female population, as the ratio of males to females become increasingly unbalanced as age increases; above age 50, there is consistently a higher population of women than men.

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| | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------|---------|---------|----------|---------|---------|
| Male Unemployed | 89440.0 | 81548.0 | 90436.0 | 79155.0 | 72252.0 |
| Female Unemployed | 95688.0 | 88289.0 | 100036.0 | 90399.0 | 84055.0 |
| Mode age | 30-34 | 30-34 | 35-39 | 35-39 | 35-39 |
| Mode immigrant age | NaN | NaN | 25-29 | 25-29 | 25-29 |
| Immigrants | NaN | NaN | 17018 | 16635 | 19047 |
| births | 1965.0 | 2114.0 | 2143 | 2068 | 2067 |
| deaths | NaN | NaN | 2730 | 2660 | 2738 |

Fig. 3. Eixample population statistics from 2013 to 2017.

Underlined in **blue**, the mode age of Eixample's existing population is **increasing**, whereas the mode immigrant age remains low at 25-29. If more immigrants joins the workforce, this could help alleviate the problem of the ageing population.

The data underlined in **green** show that immigrant numbers are **rising** (with the exception of 2015, which we will analyse in the "Outliers" section), which could either lead to more unemployment, or a larger, younger workforce if they have sufficient employment opportunities.

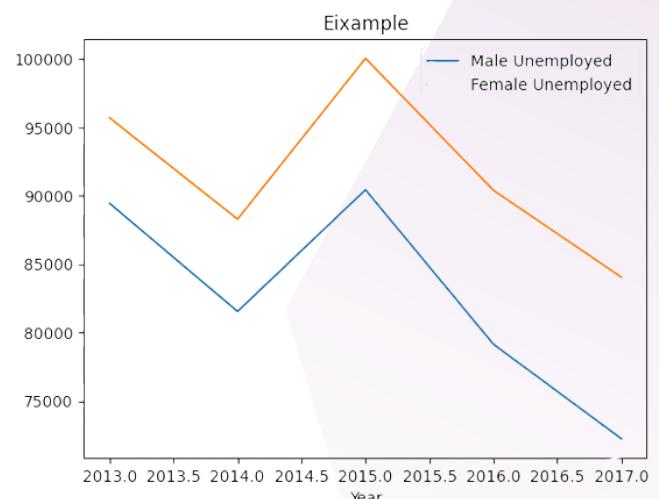


Fig. 4. Unemployment in Eixample from 2013 to 2017.

Highlighted in **yellow**, the birth rates are **steadily falling** since 2015, probably as a result of the significant economic growth and development (as explained in the "Outliers" section), further confirming the signs of an ageing population. The number of deaths are quite unstable, which could be due to various factors such as accidents, diseases or attacks (explained further in the "Outliers" section).

As seen in Fig. 4, female unemployment is **higher** than male unemployment across all 5 years, and despite the general downward trend, unemployment rates are quite unpredictable depending on the economy's performance as seen by the spike in 2015. Female unemployment is also **dropping slower than male unemployment**, as there are still over **80,000** females unemployed in 2017, compared to around **70,000** for males. (Fig. 3)

We can therefore conclude that Eixample, the most populated district, also has the **most** significant problems regarding **female** and **immigrant unemployment** and an **ageing population**.

An unexpected finding during our data analysis was the correlation between the number of public transport options and number of accidents in a district, as shown on the right.

The high Pearson correlation coefficient shows that districts with **more** public transport options (e.g. Eixample) also have **high** accident rates, which could imply that they are quite dangerous.

To further confirm this relationship, we compared the geographical coordinates of bus stops and high-risk accident zones in each district (see next page).

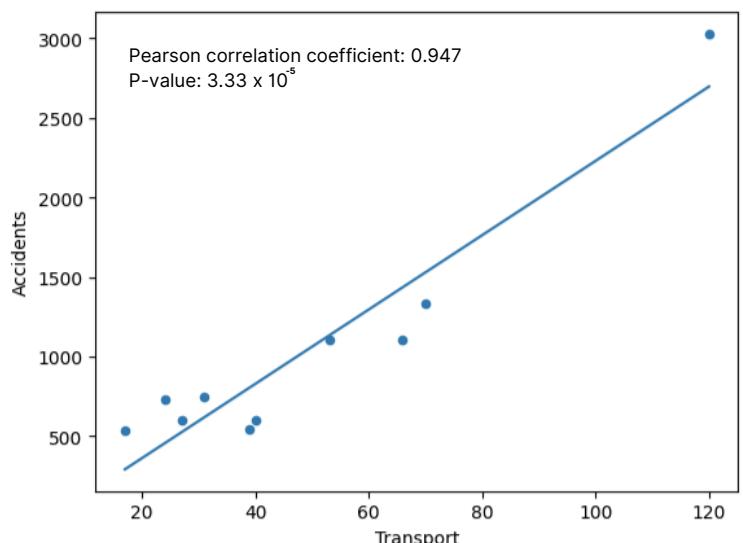


Fig. 5. Correlation between the number of public transport options and number of accidents in a district

Uber Hackathon Data Analysis

| District Name | accident zone long | bus stop long | difference in long | accident lat | bus stop lat | difference in lat | distance |
|---------------------|--------------------|---------------|--------------------|--------------|--------------|-------------------|----------|
| Ciutat Vella | 2.177 | 2.177 | 0.000 | 41.382 | 41.385 | -0.003 | 0.003000 |
| Eixample | 2.163 | 2.169 | -0.006 | 41.394 | 41.390 | 0.004 | 0.007211 |
| Gràcia | 2.156 | 2.148 | 0.008 | 41.409 | 41.410 | -0.001 | 0.008062 |
| Horta-Guinardó | 2.144 | 2.158 | -0.014 | 41.424 | 41.422 | 0.002 | 0.014142 |
| Les Corts | 2.133 | 2.112 | 0.021 | 41.391 | 41.385 | 0.006 | 0.021840 |
| Nou Barris | 2.182 | 2.175 | 0.007 | 41.439 | 41.460 | -0.021 | 0.022136 |
| Sant Andreu | 2.191 | 2.191 | 0.000 | 41.447 | 41.439 | 0.008 | 0.008000 |
| Sant Martí | 2.187 | 2.201 | -0.014 | 41.407 | 41.410 | -0.003 | 0.014318 |
| Sants-Montjuïc | 2.135 | 2.141 | -0.006 | 41.375 | 41.375 | 0.000 | 0.006000 |
| Sarrià-Sant Gervasi | 2.133 | 2.097 | 0.036 | 41.398 | 41.398 | 0.000 | 0.036000 |

Fig. 6. Comparison of longitude / latitude of bus stops and accident zones

The distance between bus stops and accident zones was calculated through the **root mean square** of the difference in longitude and latitude coordinates. By converting this distance to metres (multiplying distance by a constant), we found that accident zones are mostly within a **0.5km** radius to bus stops, which is quite close.

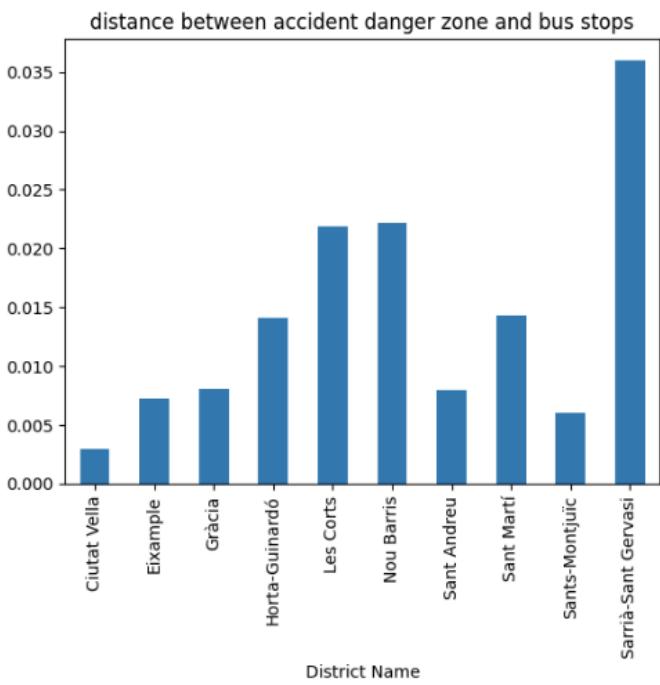


Fig. 7. Distance (difference in longitude / latitude) between accident zones and bus stops

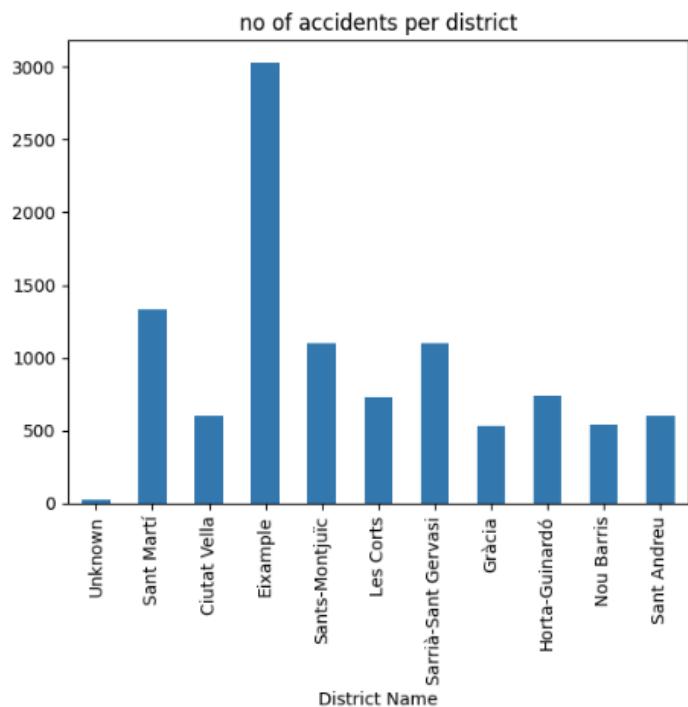


Fig. 8. Number of accidents in each district

We found that the distances for high-population districts (e.g. Eixample) is generally **lower**, meaning that there are **higher chances** of accidents near bus stops in those districts. Fig. 8 clearly illustrates the more populated districts (e.g. Eixample / Sant Martí, see Fig. 1.) having the **most** number of accidents, where Eixample has **over double** the amount of any other district.

OUTLIERS (AND OTHER ISSUES)

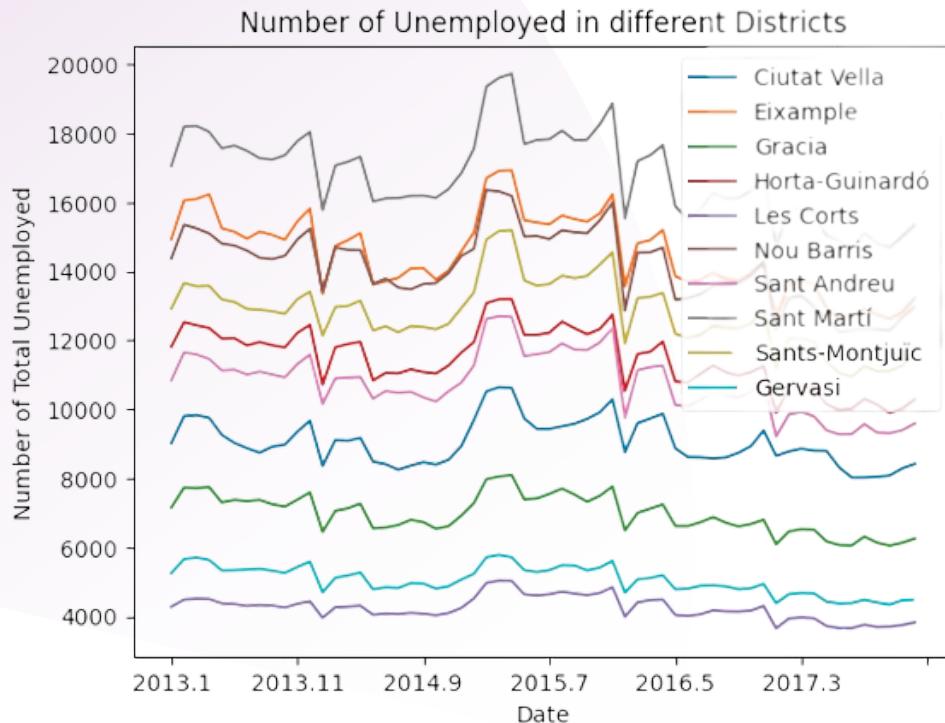


Fig. 9. Unemployment in different districts over time

After the 2008 financial crisis, Spain struggled with recession and high unemployment, with its GDP decreasing by **9%** (aggregated) during 2009-2013 and over **25%** of Spain's workforce unemployed by 2012. (Wikipedia) Although Spain recovered by 2015 (see outliers in Fig. 3, Fig. 4, Fig. 9), showing a decreasing trend in unemployment due to a **3.2%** increase in GDP (highest among large EU economies), there is still seasonal and structural unemployment, largely due to the oversized building and housing related industries. (Wikipedia)

The sudden increase in deaths in 2017 could be partially due to the 2017 Barcelona attacks by ISIS terrorists, or increased suicide rates. (MacroTrends)

The **quality** of some datasets were **suboptimal** as we found empty / **unknown fields** in them. For example, the accidents dataset had many rows with an unknown district, which made it difficult to find correlation.

The effect of **sampling bias** would be especially significant for the accidents dataset, as it only represented 1 year (2017), while the others had 5. The unemployment data also has **seasonal biases**, as there would be seasonal fluctuations due to variations in hiring patterns, school schedules, or weather-related impacts on certain industries etc. that are not accounted for.

Citations:

“Economy of Spain.” Wikipedia, Wikimedia Foundation, 7 Sept. 2023, en.wikipedia.org/wiki/Economy_of_Spain#:~:text=In%202015%2C%20the%20Spanish%20GDP,the%20world%20financial%20crisis%20struck.

“Spain Suicide Rate 2000-2023.” MacroTrends, www.macrotrends.net/countries/ESP/spain/suicide-rate. Accessed 21 Sept. 2023.

UBER'S SOLUTION:

Given Uber's low popularity with locals due to cultural preference of choosing local services and expensive pricing, we believe Uber should focus on promoting **UberEats** in Barcelona, which has shown promise with over **20%** of the market share. This also avoids the issue of stealing jobs from taxi drivers, as Uber drivers consist mostly of taxi drivers. It is also **cheaper** to buy motorcycles for food delivery, instead of a cab, which would attract a larger supply of labour, as many are discouraged to become an Uber driver due to the high cost of buying a cab and obtaining a VTC (Vehicle with Driver) licence. Compared to Uber, UberEats does not require as much communication and language skills, making training much simpler as delivery partners do not need to talk to tourists in English or other languages, unlike Uber drivers who will meet many tourists in crowded districts like Eixample.

While it would be popular with consumers in the market, it would also be very popular with businesses and restaurants, as UberEats offers options for businesses and local restaurants. This will increase publicity and consumer awareness of both Uber and the companies it works with.

Our solution is composed of two main objectives: **recruiting more female employees** and **recruiting more immigrants**.

RECRUIT MORE FEMALE EMPLOYEES

JUSTIFICATION

To attract demand of both citizens and workers, improve its reputation and thus presence in Barcelona, Uber should ensure that their policies and practices promote **gender equality** and **inclusivity**, creating a welcoming space for women in the delivery industry. As there is now an **unbalanced** ratio of men to women in Barcelona, with higher female unemployment rates than male, if Uber hired more female drivers, that would not only reduce inequality but also problems of unemployment, which are worsened by the ageing population as seen above.

IMPLEMENTATION

By implementing targeted advertising campaigns to attract women to become delivery partners, and providing comprehensive training programs, Uber can help increase the representation of women in their workforce.

Safety is a significant concern of many female workers, and as presented above, accidents are extremely common in populated districts like Eixample, so Uber **must** prioritise the safety of their delivery partners, implementing and enhancing their in-app emergency support, real-time GPS tracking, and anonymous reporting of safety concerns. This should be easily doable with Uber's software development team, and the small edits should not **cost** much time or money.

The support for female delivery partners can be further supported by **mentorship programs** where experienced female delivery partners provide guidance and support to new entrants. Additionally, they can create **networks and forums** where women can connect with each other, share experiences, and seek advice, building a sense of community within the delivery industry. For maximal support, Uber can also collaborate with **local organisations** to reach out to existing networks and workers, especially those that focus on empowering women and addressing unemployment. These organisations usually do not request fees and therefore could be easily implemented.

Uber should collect and analyse data regarding **gender representation** and **pay equity** within their delivery workforce. By regularly publishing this information, they can hold themselves accountable and demonstrate their commitment to gender equality. Transparent reporting can also help identify any disparities and guide efforts to address them effectively.

RECRUIT MORE IMMIGRANTS

JUSTIFICATION

As the number of deaths exceed the number of births by an increasing amount each year, while the number of immigrants are steadily rising, Uber should target **immigrants** as potential delivery partners, preventing structural unemployment due to their lack of skills while **reducing** the shrinkage of the labour force due to low birth rates. Language and communication skills are not required for UberEats drivers, compared to regular Uber drivers who will meet many locals and tourists every day. As seen in Fig. 3, hiring immigrants could also help tackle the ageing population as they have a lower mode age, whereas the mode age of the population keeps rising.

IMPLEMENTATION

Uber should offer **basic language** and **cultural training programs** specifically tailored for immigrants interested in the delivery industry, providing cultural orientation relevant to the local context. This can be aided by partnerships with immigrant support organisations like UNHCR Spain or Open Cultural Center, which further increases the presence of UberEats in Barcelona. The immigrants should be able to speak basic Spanish after a few sessions, so **costs** would be quite low.

Uber can actively **reach out** to immigrant communities through **job fairs**, **community events**, and **cultural festivals** that cater to immigrant populations. By engaging with local immigrant associations, religious institutions, and community centres, Uber not only promotes their food, but also the job opportunities they offer to the public, potentially gaining both consumer demand and attracting supply of labour.

To make UberEats a diverse, yet inclusive space for immigrants, Uber should develop their own **initiatives** to promote equal opportunities. It is especially important to implement **non-discriminatory** hiring practices, foster a supportive work environment, and create opportunities for career advancement. Uber should provide **multilingual materials** and **online resources** that clearly outline the steps to becoming a delivery partner. This helps eliminate language barriers and ensures that immigrants have access to the necessary information.

To more effectively address immigrant unemployment, Uber could collaborate with other delivery companies and reduce unemployment collectively, sharing the best practices, training initiatives and referral networks. This would be the **most cost-effective way** to execute marketing campaigns, create training material and understand the market. Through further data analysis, sharing trends on immigrant employment and retention rates, Uber and other delivery companies can gain insights into the effectiveness of their strategies and make informed, data-driven decisions to improve immigrant employment outcomes.

As we believe Eixample will remain the most populated, yet most dangerous district with the highest unemployment numbers in the future, we hope Uber can simultaneously alleviate some of its structural unemployment issues and balance out the gender inequality in food delivery.



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