The Analysis of Developers vs. Salaries: A Data-Driven Look at Egypt's Tech Landscape

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Introduction:

Some chase job titles. Others chase tech trends. But in 2024, the most important thing for many aspiring developers in Egypt is clear — understanding what their skills are actually worth.

Many students and junior developers enter the tech field thinking salary differences are minor. But the reality is far more complex. Developers with similar experience and skills can earn vastly different salaries depending on factors like work type, location, and job model. Some benefit from high-paying remote roles, while others face limited opportunities and lower compensation.

This report is designed to give future developers the clarity they need. Using real salary data from Egyptian developers in 2024, it breaks down how income varies across full-time vs. part-time roles, urban vs. developing regions, and remote vs. on-site jobs.

Research Question:

How do job roles, experience level, work type, work schedule, and location affect developer salaries in Egypt?

Hypothesis:

1) *Do developers working in different job roles (e.g., Frontend, Backend, Mobile, DevOps) earn significantly different average salaries?*

<u>Null Hypothesis :</u>
There is no significant difference in average salaries between developer job roles.

<u>Alternative Hypothesis :</u>
There is a significant difference in average salaries between at least two developer job roles.

2) *Does a developer's level of experience (e.g., 0–1 years, 2–3 years, 3+ years) significantly affect their salary?*

<u>Null Hypothesis :</u>
Developer experience level has no significant effect on salary.

<u>Alternative Hypothesis :</u>
Developer salary varies significantly based on experience level.

3) *Is there a significant difference in average developer salaries based on work type (e.g., On-site, Remote, Hybrid)?*

<u>Null Hypothesis :</u>
There is no significant difference in average salaries between work types.

<u>Alternative Hypothesis :</u>
Average salaries differ significantly between at least two developer work types.

4) *Do developers living in urban cities (like Cairo) earn significantly more than those in developing cities (like Tanta or Aswan) in diff roles?*

<u>Null Hypothesis :</u>
There is no significant difference in the average developer salaries between urban cities and developing cities.

.Alternative Hypothesis :
   There is a significant difference in the average developer salaries between urban cities and developing cities.

5) *Do full-time developers earn more than part-time developers?*
Null Hypothesis :
        There is no difference in average salary between full-time and part-time workers.

.Alternative Hypothesis :
   There is a significant difference in the average developer salaries Full-time and part-time developers

Population of Interest:

Developers student in Egypt.

Dataset:

This dataset captures insights into the salaries of developers working in Egypt in 2024. It includes various attributes about job roles, experience levels, company types, and work environments.

 A brief description of each column:

   Title: The job title or role of the developer (e.g., Dotnet Developer, Android Developer)

   Years of Experiences: The number of years (or months) of experience the developer has.

   Salary: The reported monthly salary of the developer in Egyptian Pounds (EGP).

   What Is your Company: Indicates the nationality of the company, typically noted as "Egyptian".

   Work Type: Specifies the working arrangement, such as On Site, Hybrid, or Remote.

   Work Hour: Defines the nature of the work schedule, such as Full Time or Part Time.

   City of Company site: The city in Egypt where the company's office is located (e.g., Cairo, Assiut).

Analysis:

Descriptive statistics:

Here is the statistics for the quantitative columns that we had in dataset :-

```
                             Mean    Median     Mode
years_of_experiences     2.022958       1.5      1.0
salary               19863.079470   15000.0   8000.0
```
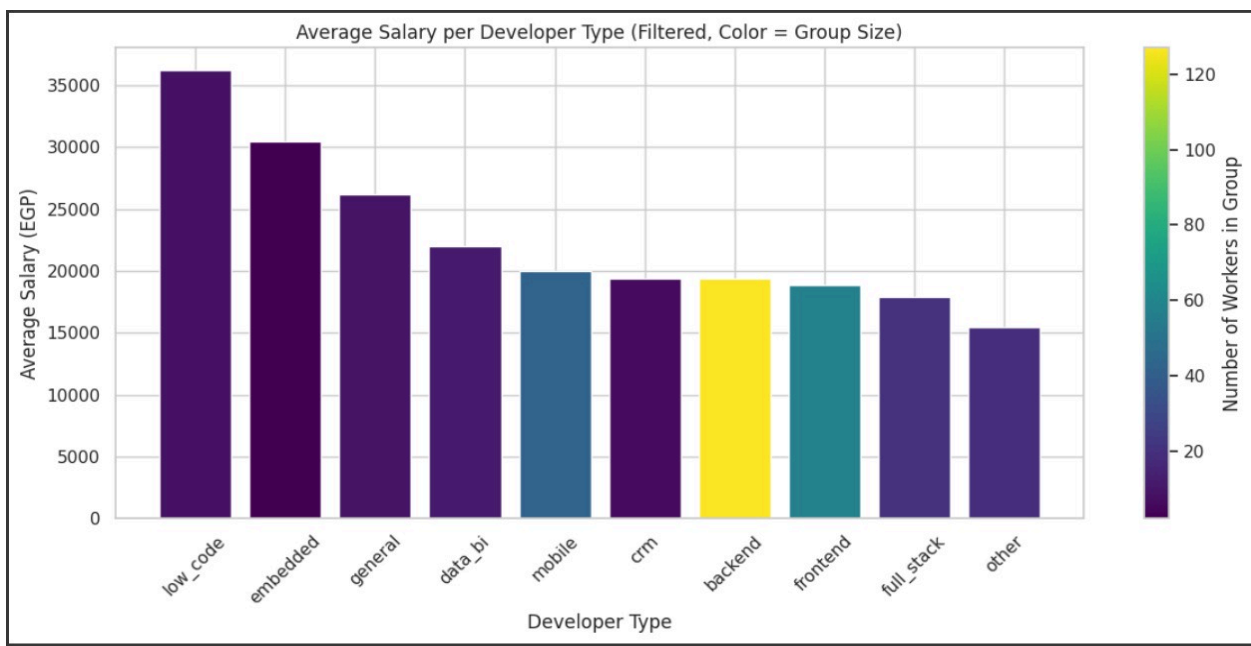
Data Visualization:

Average Salary per Developer Type (Filtered, Color = Group Size)

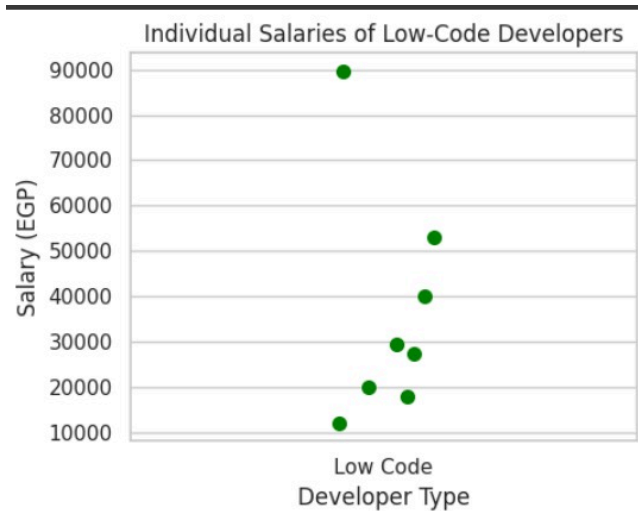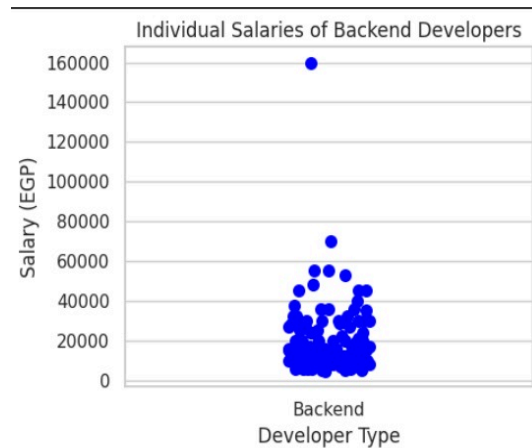**Fig 1.0**

Fig 1.01

Fig 1.02

Figure 1.0 illustrates the **average salary** (in EGP) for different **developer roles** in Egypt, with **bar color representing the number of workers** in each role. The roles include **frontend, backend, mobile, embedded, low-code, CRM**, and others, providing a broad comparison across job functions. To determine whether these salary differences are **statistically significant**, an **ANOVA (Analysis of Variance)** test was conducted. The resulting **p-value was 0.2510**, which is greater than the commonly accepted threshold of **0.05**.

This indicates that there is **no statistically significant difference** in average salaries across the various developer roles. While some roles like **low-code and embedded** appear to offer higher average salaries visually, these differences are **not strong enough statistically** to conclude that job role alone causes meaningful variation in pay. One possible explanation for this result is the **variation in the number of workers** across roles. As shown by the color scale, roles like **backend and frontend** have a much **larger workforce**, which can **pull average salaries down** due to **greater supply**, while roles with **fewer workers** may show **inflated averages** because of **smaller sample sizes**.

Also in Fig 1.01,1.02, low-code developers earn one of the highest average salaries, even though very few people work in this role. This is likely because low-code jobs have high requirements. These roles often need both technical skills and a good understanding of business needs. Since not many people meet these requirements, companies are willing to pay more to hire the right talent. So even though the number of workers is small, the demand is high, which leads to higher salaries.

Individual Salaries and Mean per Developer Type
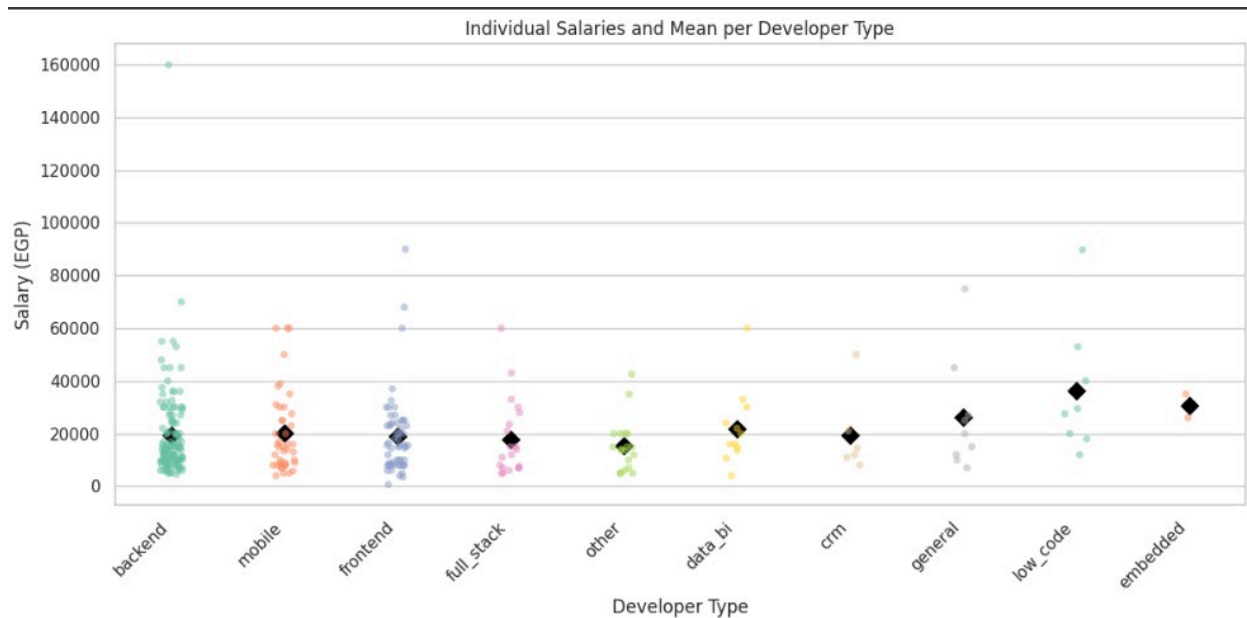
Fig 1.1

Figure 1.1 shows **individual developer salaries** by **job type**, with **black diamonds** marking the **mean salary** for each role. We used this graph to **confirm** the result of the **ANOVA test**, which produced a **p-value of 0.2510**. This high p-value indicates there is **no statistically significant difference** in **average salaries** between developer roles.

The plot shows that most job types have **overlapping salary distributions**, and the **mean salaries** are **relatively close** to each other. This supports the conclusion that **job role alone** does **not have a strong impact on salary**. Instead, differences in salary may be influenced more by factors such as the **number of workers** in each group or the presence of a few **outlier salaries**.

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Fig 1.2 Average Salary by Experience Group

The graph titled **"Average Salary by Experience Group"** illustrates the relationship between developers' years of experience and their average monthly salaries in Egypt, measured in EGP. Developers are categorized into three groups based on experience: **0–1 years**, **2–3 years**, and **3+ years**. The graph shows a clear upward trend, where salary increases significantly with more years of experience. Entry-level developers (0–1 years) earn an average of **approximately 12,000 EGP** per month. Those with 2–3 years of experience earn around **21,000 EGP**, while developers with over 3 years of experience earn the highest average salary of **about 38,000 EGP**. This substantial rise in salary with increased experience highlights the strong impact of professional growth on earning potential.

To statistically determine whether these differences are significant, a **ANOVA test** was conducted. This test is appropriate because we are comparing the average salaries across **more than two independent groups**. The results yielded a **p-value of 0.0000000000000000000000000084353**, which is far below the commonly used significance

level of **0.05**. Based on this, we **reject the null hypothesis**, which states that developer experience level has no significant effect on salary. Instead, we **accept the alternative hypothesis**: developer salary **varies significantly based on experience level**.

These findings confirm that experience plays a crucial role in salary growth for developers in Egypt. The combination of visual trends and statistical evidence makes it clear that gaining more years of experience leads to significantly higher compensation in the tech industry.
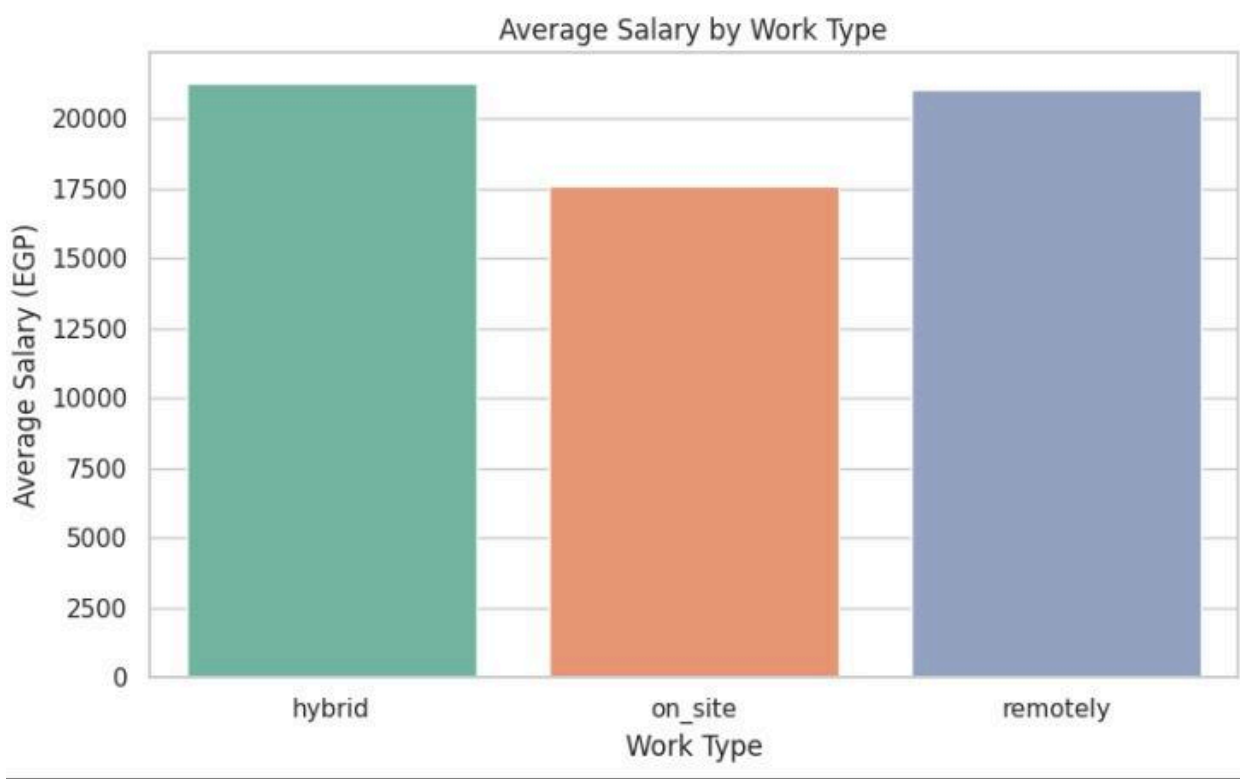

Fig 1.3 Work Type vs. Salary

Work type distribution:
Fig 1.3 illustrates the average salaries for developers in Egypt based on three different work arrangements: **hybrid**, **on-site**, and **remote**. Developers working in **hybrid** roles earn the highest average salary, followed closely by those working **remotely**, with both groups averaging around **21,000 EGP**. In contrast, **on-site** developers earn the lowest, with an average salary of

approximately **17,500 EGP**. While the differences are visually noticeable, particularly between hybrid/remote and on-site work types, the salary variation is relatively modest in scale.

Statistical Testing:

To determine whether these observed differences in average salary across work types are statistically significant, an **Anova test** was conducted. This test is suitable as it compares the means between two or more independent groups. The resulting **p-value was 0.1925**, which exceeds the common significance threshold of **0.05**. Based on this result, we **fail to reject the null hypothesis**, meaning that there is **no statistically significant difference** in average salaries across work types.

Analysis:
Although the visual representation suggests that developers working remotely or in hybrid settings tend to earn more than their on-site counterparts, the statistical test indicates that these differences are **not statistically significant**. This implies that **work type alone is not a strong predictor of salary differences** within this dataset. Factors such as experience, role specialization, or company policy may play a more critical role in determining salary levels. The results suggest that while flexible and remote work may offer non-monetary benefits like work-life balance, they do not necessarily guarantee higher pay within this sample of Egyptian developers.

Average Salary: Urban vs Developing Governorates
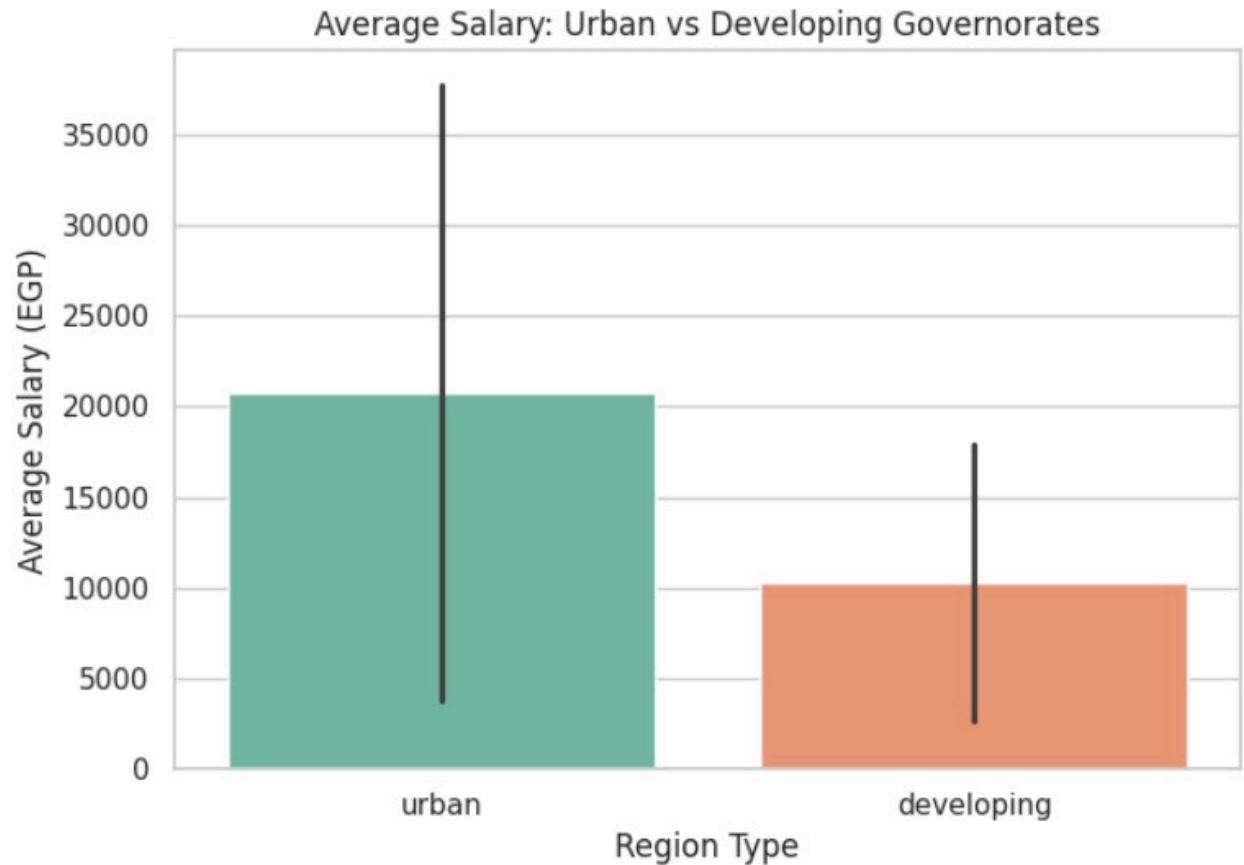
Fig 3.0

Figure 3.0 compares the **average salaries** of developers working in **urban** versus **developing governorates** in Egypt. Urban areas include **Cairo, Alexandria**, and **Giza**, while developing regions consist of **Assiut, Mansoura, New Damietta, Aswan, Tanta**, and **Mansoura Dakahlia**. The bar chart shows that developers in **urban areas** earn a significantly **higher average salary** than those in developing regions.

To test if this difference is **statistically significant**, a **two-sample t-test** was conducted. The resulting **p-value was 0.0000009837**, which is far **below the 0.05 significance threshold**. This allows us to **reject the null hypothesis**, confirming that there is a **significant difference in average salaries** between developers based on their region.

The visual and statistical results together indicate that **location** plays a major role in determining developer salaries in Egypt. Developers in urban regions have access to **higher-paying opportunities**, likely due to **stronger tech ecosystems, more job availability**, and better infrastructure compared to developing areas.
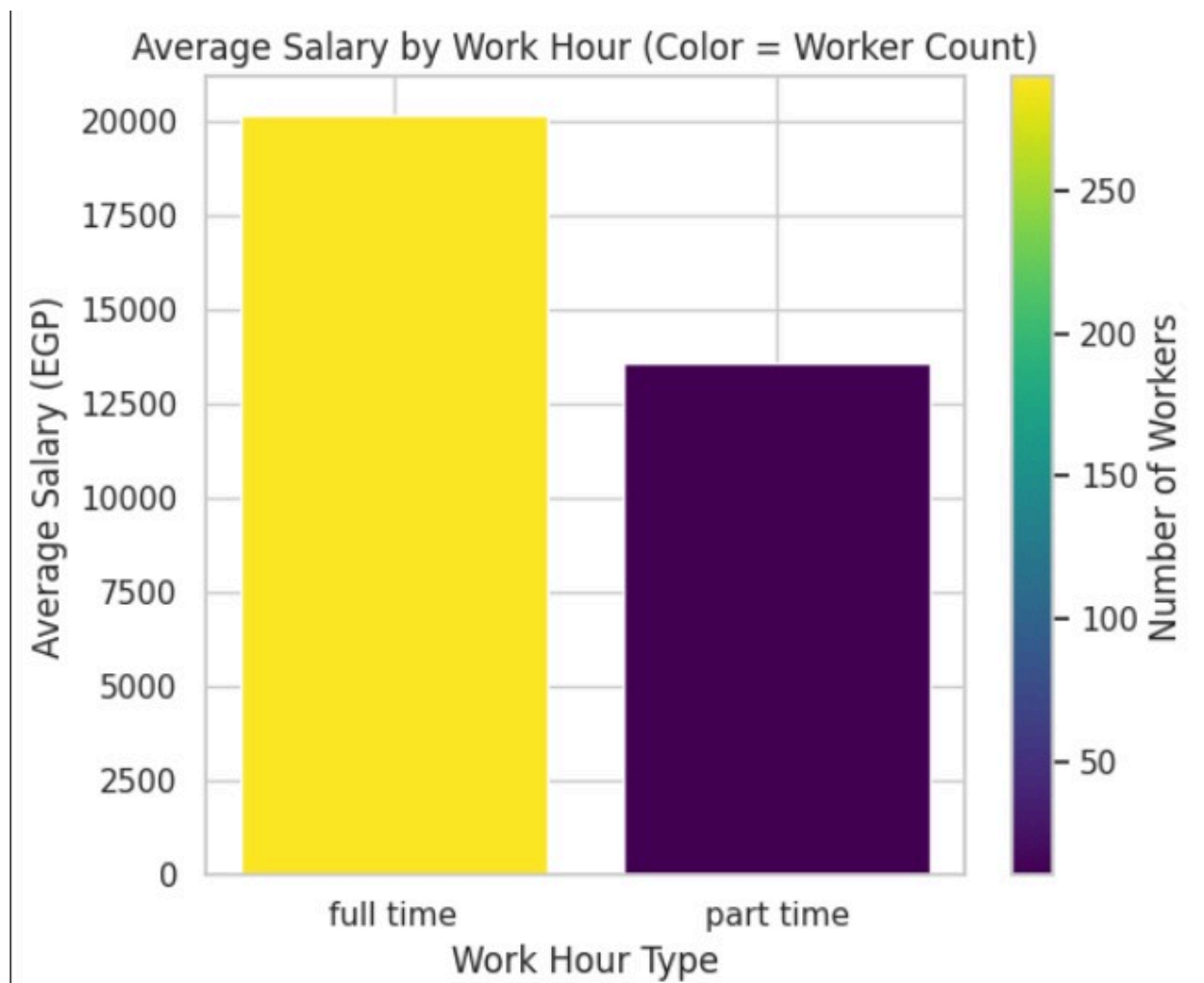

Fig 3.1

Figure 3.1 shows the average salaries of developers who work full-time compared to those who work part-time. On average, full-time developers appear to earn more than part-time developers.

However, a statistical test (specifically, a t-test) was conducted to determine whether this observed difference is statistically significant or could have occurred by random chance. The test produced a p-value of 0.1401, which is greater than the conventional threshold of 0.05.

As a result, we fail to reject the null hypothesis, meaning there is not enough statistical evidence to conclude that full-time developers earn more than part-time developers in a meaningful way.

This suggests that the observed difference in average pay may not be due solely to full-time versus part-time status. Instead, other factors—such as role type, experience, skill level, or the kind of company—might have a more substantial influence on salary. So, working full-time does not necessarily guarantee significantly higher earnings compared to part-time work, depending on the context of the job.

Hypothesis Testing Steps:

- · Step 1: Define null and alternative hypothesis
- · Step 2: Choose the appropriate test
- · Step 3: Calculate the p-value
- · Step 4: Determine the statistical significance

1.Hypothesis testing for Developer Job Role vs. Salary
- ● Step 1:
  Null Hypothesis: There is no significant difference in average salaries between developer job roles.
  Alternative Hypothesis: There is a significant difference in average salaries between at least two developer job roles.

- Step 2:
  Since we are comparing the average salaries across more than two groups (multiple job roles), the appropriate statistical test is **Anova.**

- Step 3:
  P-value = 0.2150

- Step 4:With the significance level of 0.05, we fail to reject the null hypothesis

2 .Hypothesis testing for Experience Level vs. Salary

- Step 1:
  Null Hypothesis:Developer experience level has no significant effect on salary.
  Alternative Hypothesis:Developer salary varies significantly based on experience level.

- Step 2:
  Since we are comparing the average salaries across more than two experience groups (e.g., 0–1 years, 2–3 years, 3+ years), the appropriate statistical test is **Anova**.

- Step 3:
  p-value = 0.00000000000000000000000000084353

- Step 4: with significance level of 0.05, we reject the null hypothesis

3.Hypothesis testing for Work Type vs. Salary

- Step 1:
  Null Hypothesis**:** There is no significant difference in average salaries between developer work types.
  Alternative Hypothesis: Average salaries differ significantly between at least two developer work types.

- Step 2:
  Since we are comparing the average salaries between two groups (e.g., On-site vs.

Hybrid), the appropriate statistical test is the **Anova**

- Step 3:
  P-value = 0.1925

- Step 4: with significance level of 0.1925, We fail to reject the null hypothesis

4.Hypothesis testing for Urban Cities Average Salaries vs. Developing Cities Average Salaries

- Step 1:
  Null Hypothesis**:** There is no difference in salaries between urban cities and developing salaries.
  Alternative Hypothesis: There is a significant difference in salaries between at least two work cities.

- Step 2:
   Since we are comparing the average salaries between the urban cities and developing cities, the appropriate statistical test is the t-test

- Step 3:
  P-value =0.00000098375941621962

- Step 4: with significance level of 0.00000098375941621962, we reject the null hypothesis

5.Hypothesis testing for Full Time vs. Part Time

- Step 1:
  Null Hypothesis**:** There is no difference in average salary between full-time and part-time workers
  Alternative Hypothesis: Full-time and part-time developers have different average salaries

- Step 2:
   Since we are comparing the average salaries between Full Time and Part Time, the

appropriate statistical test is the t-test

- Step 3:
    P-value = 0.1401

- Step 4: with significance level of 0.1401, we fail to reject null hypothesis

Conclusion:

This study set out to explore how various factors influence developer salaries in Egypt, focusing on job role, experience level, work type, and geographic location.Our goal was to provide actionable insights for aspiring developers, especially students deciding their career direction in the tech field.

For Hypothesis 1, which tested whether average salaries differ significantly across developer roles, the Anova test yielded a p-value of 0.2510, exceeding the 0.05 significance level. Therefore, we fail to reject the null hypothesis. This suggests that job roles alone do not have a statistically significant impact on developer salary in Egypt, even though some roles appear to offer higher pay visually.

In Hypothesis 2, we examined whether experience level affects salary. The Anova test produced an extremely low p-value of 0.00000000000000000000000000084353, which is well below the 0.05. As a result, we reject the null hypothesis, confirming the experience level has a significant and positive impact on salary. Developers with more years of experience earn substantially higher, making experience the strongest predictor of pay in the study.

For hypothesis 3. We tested whether work type (on-site,hybrid, remote) influences salary, Anova test returned a p-value of 0.1925, leading us to fail to reject the null hypothesis. While hybrid and remote roles showed slightly higher average salaries, the differences were not statistically significant, indicating that work arrangement alone may not meaningfully influence developer compensation.

Lastly for hypothesis 4 showed salary differences between developers in urban versus

developing cities. The two sample t-test resulted in a p-value of 0.0000009837, allowing us to reject the null hypothesis. This provides strong evidence that developers in urban areas earn significantly more than their counterparts in developing regions, likely due to strong job markets, and more tech companies in major cities.

In summary, experience level and geographic locations emerged as the most influential factors on developer salaries in Egypt, while job role and work type did not show statistically significant effects. For students entering the field, this means that investing in experience (through internships, projects, or continuous learning) and seeking opportunities in urban tech can lead to higher earning potential, regardless of the specific developer path chosen.

Obstacles:

During our analysis,we faced several challenges that required handling to make to get the accurate results , initially we had to clean the dataset because there was many problems, There were alot of different jobs titles that dataset messy and hard to work with which will cause so problems in visualization so we made it about developers so to make it more easier on us to make the good analysis,we also found that the salaries sometimes in USD sometime single number with 'k' like 9k sometimes there's "9000 pounds" so we make it all of it first all egyptian pound without any letters or words to get the right descriptive data.

Also,we founded a lot places outside of egypt so we removed it because it will cost us a trouble will lead to bias in our analysis and we found a lot of non egyptian that wasn't working in egypt even we cleaned them,so that's all problems that we faced in this dataset so let's dive in problems we faced in the analysis.

In first hypothesis test we made was about is there significance between job roles and salaries so we made the **ANOVA** test to get the p-value and we made the visualization so there's was some debates between team members that group said "i saw no significant difference" and the other group say "i saw the significant difference" so we made another visualization called scatter plot to confirm our p-value results.

Also, another problem, not all participants provided complete information, especially when it came to their salaries. This missing data can affect the accuracy of our results, as it reduces the number of valid entries available for comparison. In addition, some job roles—such as backend or frontend had a much larger number of responses than others like embedded or low-code. This uneven distribution can make it harder to compare salaries fairly across roles, since a small number of entries might not represent the true average for that job type. Together, these issues highlight the challenges of relying on self-reported data, where gaps and imbalances can impact the overall reliability of the analysis.