Canadian IT & Analysis Wages

(2014-2023)

Exploring Wage Data from Canada's Open Government Portal

Toronto School of Management

Data Design - May 2024

Final Project for Group (4)

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Contents

I- Introduction

1- Why This Project

This project analyzes Canadian IT & Analysis wages to understand how much people in these fields earn. It serves as a market research tool for jobs, aiding in making informed decisions about pursuing careers in IT & Analysis. By exploring different specializations within these fields, we can compare their earning potential.

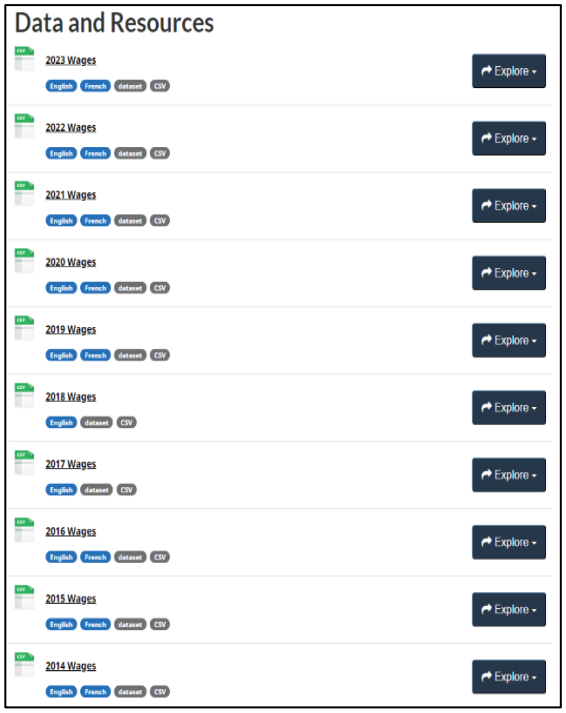
2- The Datasets:

The **Canadian Wage Dataset** provides comprehensive wage estimates for various occupations, including minimum, median, and maximum wages.

Covering the years 2012 to 2023, it offers insights into earnings across regional, provincial, and national levels.

This dataset is crucial for analyzing labor market trends and understanding wage distributions based on the National Occupational Classification.

For this project, we selected data from 2014 to 2023, focusing on **10 occupations** related to the IT and analysis fields, and on **9 provinces in Canada** with clear data.



For more information, visit the Open Government Portal. For more information, visit the Open Government Portal.

3- The main questions:

A- What is the yearly wage situation for IT & Analysis occupations in Canada?

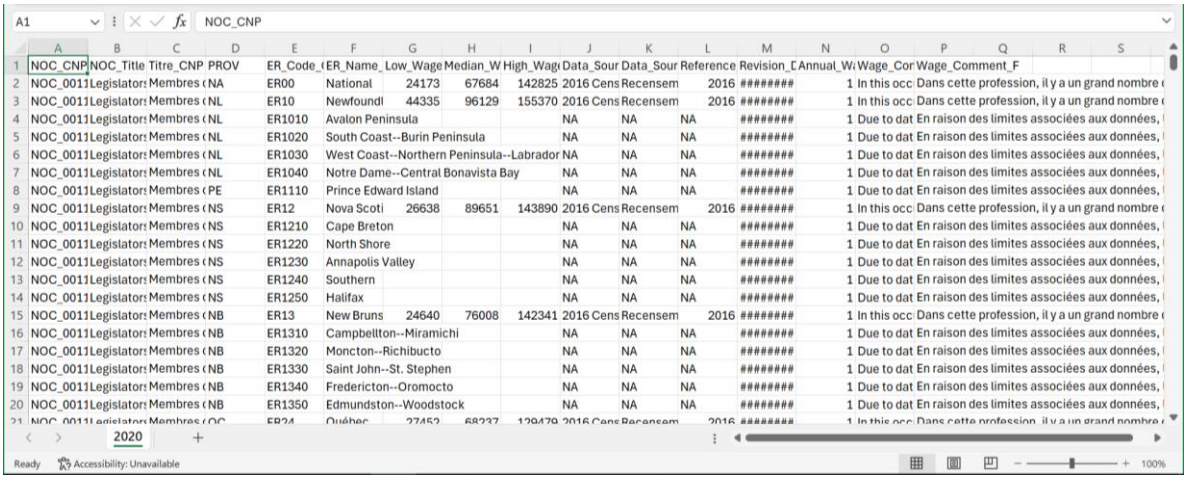
B- How are regions distributed on the map of Canada concerning wage areas?

C- How have wages changed over the years in three major provinces?

D- How have wages changed over the years for three occupations across states and regions?

II- Data Preparation

1- Understanding the datasets



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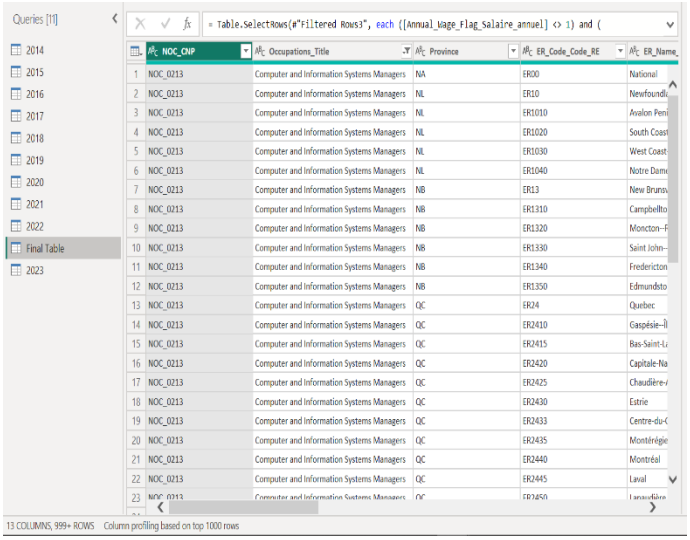
For data preparation, we collected data from the Open Government Portal Canada, spanning the past 10 years (2012-2023). Initially, we believed we had gathered all necessary datasets and could quickly conclude our project. However, upon reviewing the datasets, we realized extensive cleaning was required. We found many null values and significant variations across the years. Additionally, the NOC (National Occupational Classification) numbers for occupations changed during the period we aimed to analyze. This initial review was a crucial part of our work, helping us familiarize ourselves with the datasets and prompting us to adjust some of our main and sub-questions effectively.

2- Prepare the data on Excel

Upon reviewing and understanding the datasets, we noticed that columns changed across the years, and some of them were presented in both English and French. To eliminate confusion, we deleted the French columns, which were exact duplicates of the English ones, and standardized the columns across all datasets. We performed extensive cleaning in Excel by removing unnecessary rows and columns, ensuring all datasets had consistent column names and numbers. Due to the large size of the datasets, dealing with them was challenging.

3- Imported the data sets on Power BI

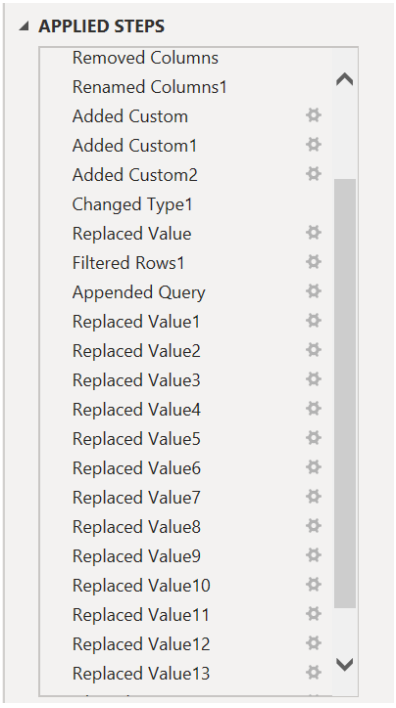


After preparing the data in Excel and focusing on 10 occupations related to Canadian IT & Analysis Wages, we named our project "Canadian IT & Analysis Wages (2014-2023)."

Subsequently, we imported each dataset into Power BI individually to meticulously check for any errors or discrepancies. During this process, we identified differences in the 2023 dataset, necessitating additional preparation in Excel before re-importing it into Power BI.

Following thorough validation, we used the "Append Queries" option in Power BI to merge all datasets into a consolidated table named "Final Table."

4- Cleaning the data using Power Query Editor



Upon importing the datasets into Power BI, we utilized Power Query Editor for comprehensive data cleaning, which included:

- Removing columns that were not relevant to our project's scope.
- Filtering for the 10 occupations pertinent to Canadian IT & Analysis Wages (2014-2023).
- Excluding provinces with null data for these selected occupations.

Additionally, we standardized the names of the chosen occupations across all datasets to ensure consistency. For example, some datasets referred to "Data Entry Clerks" while others used "Data entry clerks."

We also adjusted data types and renamed columns to enhance clarity and maintain consistency throughout the dataset.

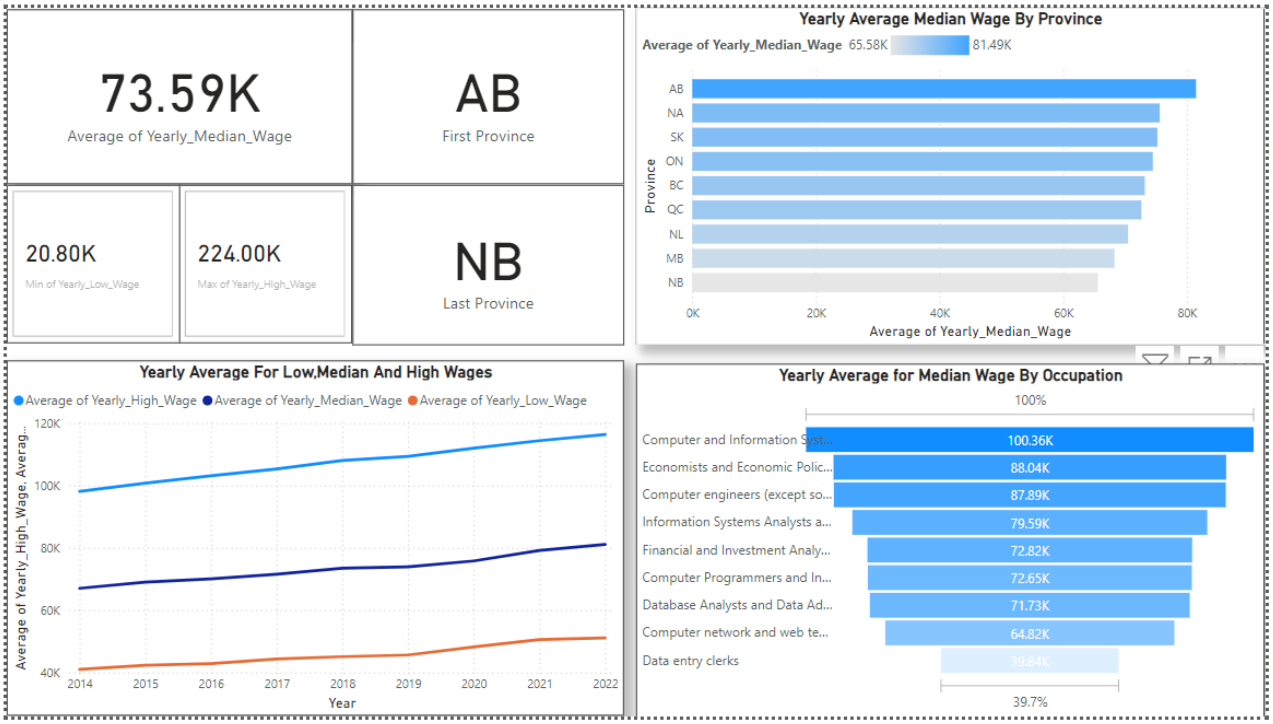
Using Power Query, we further enriched the dataset by creating custom columns to calculate annual wages for low, median, and high categories. This computation was based on multiplying hourly wages by 2080, aligning with the standard number of working hours per year as per Canadian labor laws.

To visually document these transformations, we captured a screenshot of the cleaned dataset within Power BI for future reference.

III- Visualization

1- What is the yearly wage situation for IT & Analysis occupations in Canada?

This dashboard provides a comprehensive analysis of the wage landscape for IT & Analysis occupations across Canada. It includes the following key visualizations:



a) Average, Minimum, and Maximum Yearly Wages in Cards:

- **Average Yearly Median Wage:** The average yearly median wage for IT & Analysis occupations across Canada is shown to be 73.59K CAD. This provides a central reference point for the earning potential in these fields.
- **Minimum Yearly Wage:** The minimum yearly wage recorded is 20.80K CAD, indicating the lower spectrum of earnings which might represent entry-level positions or lower-paying regions/occupations.
- **Maximum Yearly Wage:** The highest yearly wage recorded is 224.00K CAD, highlighting the potential for high earnings in senior roles or high-demand specializations.

b) Provincial Wage Comparisons in Cards:

- **Highest Wage Province (AB):** Alberta (AB) is highlighted as the province with the highest average yearly median wage at 81.49K CAD. This suggests that Alberta offers the most lucrative opportunities for IT & Analysis professionals.

- **Lowest Wage Province (NB):** New Brunswick (NB) is identified as the province with the lowest average yearly median wage at 65.58K CAD, suggesting that wages in this province are comparatively lower for these occupations.

c) Trends Over 10 Years in Line Chart:

- The line chart displays changes in the average yearly high, median, and low wages over a 10-year period (2014-2023). It shows a steady increase in wages, indicating a growing demand and improved compensation for IT & Analysis roles. This trend highlights the sector's positive growth trajectory for the median, lower and higher hourly wages in the period of 10 years for the occupations in Line chart

d) Provincial Median Wages in Bar Chart:

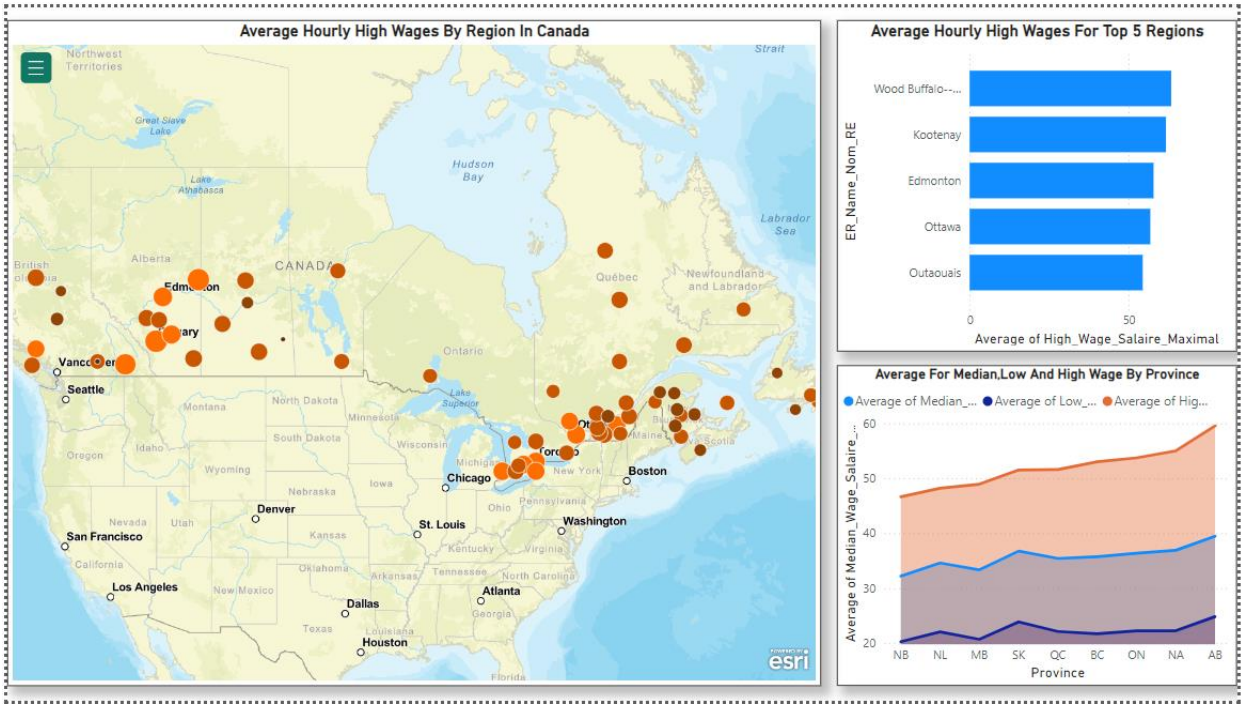
- The bar chart ranks the median wages across 10 provinces from highest to lowest. This visual representation helps identify which provinces offer better compensation for IT & Analysis professionals. Alberta (AB), Saskatchewan (SK), and Ontario (ON) are among the top provinces, while New Brunswick (NB) and Manitoba (MB) are on the lower end.

e) The Occupational Median Wages in Funnel chart:

- The funnel chart illustrates the median wages for the 10 chosen IT & Analysis occupations, ranked from highest to lowest. Key observations include:
  - Highest Earning Occupation: Computer and Information Systems Managers have the highest median wage at 100.36K CAD, reflecting their critical role in managing IT strategies and operations.
  - Lower Earning Occupations: Data entry clerks have the lowest median wage at 39.7K CAD, indicating that roles requiring less specialized skills tend to offer lower compensation.
  - Middle Range Occupations: Positions like Database Analysts and Data Administrators (71.73K CAD) and Information Systems Analysts (79.59K CAD) fall in the mid-range, offering substantial wages but not as high as managerial roles

2- How are regions distributed on the map of Canada concerning wage areas?

This dashboard focuses on the geographic distribution of hourly wages for IT & Analysis occupations across Canada, providing visual insights into regional wage disparities. Key visualizations include:



a) Geographic Distribution of Hourly Wages in Map Visualization:

- The map shows the geographic distribution of hourly wages across various regions in Canada. The size and color of the markers indicate the wage levels, with larger and lighter markers representing higher wages. This visualization helps identify which areas offer lighter compensation for IT & Analysis roles.
- Western Canada: Regions in Alberta and British Columbia, particularly cities like Edmonton and Vancouver, show larger and lighter markers, indicating higher hourly wages.
- Eastern Canada: Areas in Ontario and Quebec also display high wage markers, with notable concentrations in cities like Toronto and Ottawa.

b) Top 5 Regions with Highest Hourly Wages in (Bar Chart):

- The bar chart identifies the top 5 regions with the highest average hourly wages. These regions are:
  - Wood Buffalo: In Alberta, leading with the highest average hourly wage.
  - Kootenay: In British Columbia, following closely with significant wage levels.
  - Edmonton: A major city in Alberta known for high wages.

- Ottawa: The capital city of Canada in Ontario, also offering high wages.
- Outaouais: Region in Québec with competitive hourly wages.

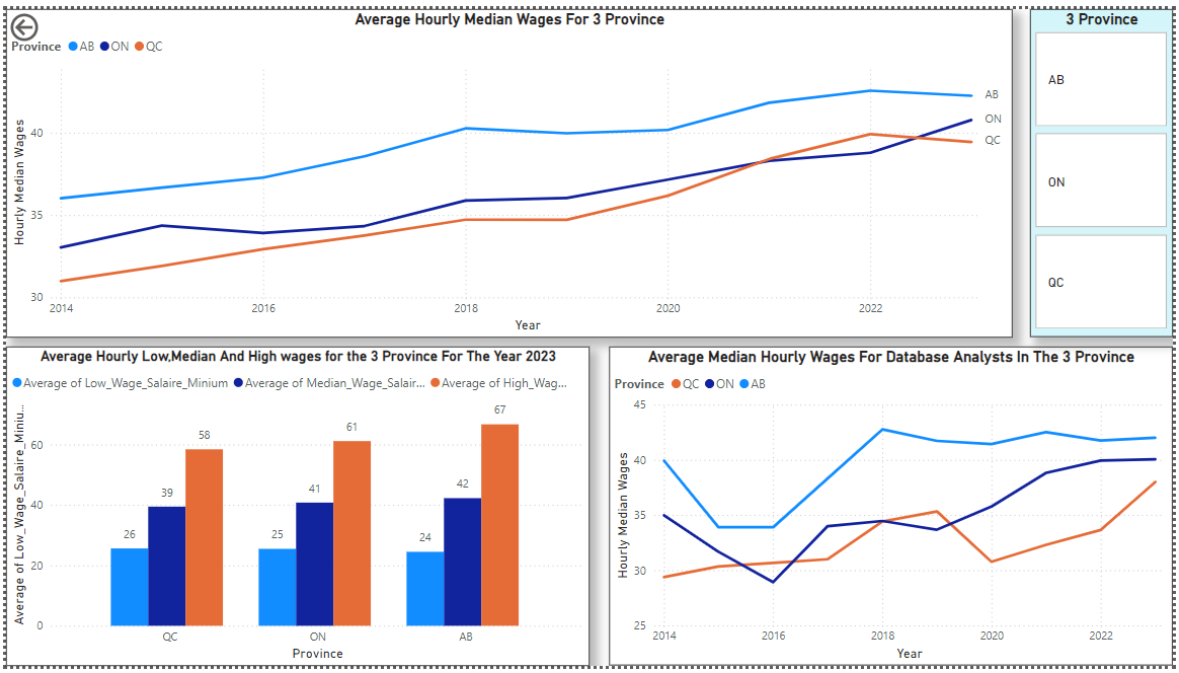
- This bar chart highlights regions where IT & Analysis professionals can expect the highest compensation, making them attractive destinations for job seekers in these fields.

c) Average Median, Low, and High Wages by Province in Area Chart:

- The area chart displays the average median, low, and high wages by province. This chart provides a comprehensive view of wage distributions across different provinces.
  - Alberta (AB): Consistently shows the highest wages across all categories (median, low, and high).
  - Ontario (ON) and British Columbia (BC): Also show high wages but slightly lower than Alberta.
  - New Brunswick (NB) and Manitoba (MB): Represent the lower end of the wage spectrum, indicating fewer high-paying opportunities in these provinces.
- The chart visually conveys the wage gap between different provinces and highlights regions with better compensation packages.

3- How have wages changed over the years in three major provinces?

This analysis focuses on the changes in wages over the past decade in three major Canadian provinces: Alberta (AB), Ontario (ON), and Quebec (QC). The analysis is presented through three visualizations:



a) Average Hourly Median Wages from 2014 to 2023 in Line chart:

- The line chart shows the average hourly median wages from 2014 to 2023 for Alberta (AB), Ontario (ON), and Quebec (QC).
    - Alberta (AB): Exhibits the highest median wages, growing from 34 CAD/hour in 2014 to 42 CAD/hour in 2023.
    - Ontario (ON): Shows steady growth from 32 CAD/hour in 2014 to just above 40 CAD/hour in 2023.
    - Quebec (QC): Has the lowest median wages but shows gradual growth from 30 CAD/hour in 2014 to 38 CAD/hour in 2023.

b) Wage Distribution in 2023 in Line and Clustered Column Chart:

- The chart compares low, median, and high wages for 2023.
    - Quebec (QC): Low 26 CAD/h, Median 39 CAD/h ,High 58 CAD/h
    - Ontario (ON): Low 25 CAD/h, Median 41 CAD/h, High 61 CAD/h
    - Alberta (AB): Low 24 CAD/h, Median 42 CAD/h, High 67 CAD/h
- Alberta shows the highest wage disparity with significant gaps between low and high wages.

c) Wages for Database Analysts in Line Chart:

- The line chart shows average median hourly wages for Database Analysts and Data Administrators from 2014 to 2023.
    - Alberta (AB): Consistent growth from 32 CAD/h in 2014 to over 44 CAD/h in 2023.
    - Ontario (ON): Steady increase from 30 CAD/h in 2014 to 43 CAD/h in 2023.
    - Quebec (QC): More variability but overall growth from 28 CAD/h in 2014 to 39 CAD/h in 2023.

4- How have wages changed over the years for three occupations across states and regions?

This analysis examines wage changes over the past decade for three specific occupations: Database Analysts and Data Administrators, Economists and Economic Policy Researchers and Analysts, and Financial and Investment Analysts. The data is visualized using a line chart, stacked bar chart, decomposition tree, and bar chart.

a) Changes in High Wages Over Time (Line Chart):

- The line chart shows the changes in high wages from 2014 to 2023 for the three occupations.
- **Database Analysts and Data Administrators:** High wages have increased from approximately 50 CAD/hour in 2014 to about 65 CAD/hour in 2023.
- **Economists and Economic Policy Researchers and Analysts**: Show a significant rise, particularly between 2018 and 2020, peaking at around 70 CAD/hour.
- **Financial and Investment Analysts**: Exhibit a steady increase from about 52 CAD/hour in 2014 to roughly 64 CAD/hour in 2023.

b) Wage Distribution in 2023 (Stacked Bar Chart):

- The stacked bar chart displays high, median, and low wages for each occupation in 2023.
- **Economists and Economic Policy Researchers and Analysts**: High Wage: 67 CAD/h, Median Wage: 45 CAD/h, Low Wage: 29 CAD/h.

- **Financial and Investment Analysts:** High Wage: 61 CAD/h, Median Wage: 40 CAD/h, Low Wage: 26 CAD/h.
- **Database Analysts and Data Administrators:** High Wage: 56 CAD/h, Median Wage: 39 CAD/h, Low Wage: 25 CAD/h.

c) Regional Wage Distribution (Decomposition Tree):

- The decomposition tree shows the distribution of high wages across various provinces and regions for the three occupations.
- Top Regions:
  - **Alberta**: Leading with an average high wage of 59.55 CAD/hour.
  - **Ontario**: Average high wage of 53.50 CAD/hour.
  - **British Columbia**: Average high wage of 53.02 CAD/hour.
  - **Quebec**: Average high wage of 51.60 CAD/hour.

d) Wages for Data Scientists in 2023 (Bar Chart):

- The bar chart shows the high, median, and low wages for Data Scientists in 2023.
- **Data Scientists**: High Wage: 77 CAD/h, Median Wage: 45 CAD/h, Low Wage: 27 CAD/h

IV- Analysis and findings

1- Key Insights for dashboard (1)

- **Regional Disparities**: There are significant regional disparities in wages, with provinces like Alberta offering much higher wages compared to others like New Brunswick.
- **Occupational Variance**: Wages vary greatly across different IT & Analysis occupations, with managerial and specialized roles commanding higher salaries.
- **Positive Wage Trends**: The consistent increase in wages over the past decade suggests a healthy and growing demand for IT & Analysis professionals in Canada.

2- Key Insights for dashboard (2)

- **Regional Wage Disparities**: There are clear disparities in wage levels across different regions and provinces in Canada. Western provinces like Alberta and British Columbia tend to offer higher wages compared to eastern provinces like New Brunswick.
- **Top Earning Regions**: Regions like Wood Buffalo, Kootenay, Edmonton, Ottawa, and Outaouais are top destinations for IT & Analysis professionals seeking high hourly wages.
- **Provincial Averages**: The area chart reveals that Alberta consistently provides the highest wages, while provinces like New Brunswick and Manitoba lag behind, suggesting that job seekers might prioritize regions with higher average wages for better career prospects.

3- Key Insights for dashboard (3)

- **Wage Growth**: Alberta and Ontario show significant growth in median wages, with Alberta leading overall. Quebec, while lower, also shows consistent growth.
- **Wage Disparities**: Alberta has the widest wage range in 2023, indicating significant wage disparities within the province.
- **Database Analysts**: Specialized roles such as database analysts show substantial wage increases, particularly in Alberta and Ontario, highlighting these provinces as favorable for IT professionals.

4- Key Insights for dashboard (4)

- **Wage Growth**: All three occupations have seen a significant increase in high wages over the past decade, with Economists and Economic Policy Researchers and Analysts experiencing the most substantial growth.

- **Wage Distribution**: In 2023, Economists and Economic Policy Researchers and Analysts have the highest wages across all categories (high, median, and low), followed by Financial and Investment Analysts and Database Analysts and Data Administrators.
- **Regional Differences**: Ontario leads in offering the highest wages for these occupations, with Alberta and British Columbia following closely.
- **Data Scientists**: In 2023, Data Scientists have notably high wages, with a significant difference between high and low wages, indicating a wide range of compensation within the field.

V- Conclusions

The Conclusion for Data Analytics Students:

1- **Focus on High-Wage Regions:**

Prioritize job opportunities in provinces like **Alberta**, **Ontario**, and **British Columbia** for higher earning potential.

2- **Choose High-Paying Occupations:**

Aim for managerial and specialized **roles** such as Computer and Information Systems Managers and Economic Analysts.

3- **Consider Regional Disparities:**

Be aware of significant regional wage disparities, with **western provinces** generally offering higher wages than **eastern provinces**.

4- **Monitor Wage Trends:**

Take advantage of the steady increase in wages over the past decade, indicating a robust and growing demand for IT & Analysis professionals.

5- **Career Growth:**

Focus on roles and regions that show consistent wage growth to ensure better career prospects and salary advancements.