**Title: Analyzing NYC Civil Job Postings: Insights and Policy Implications**

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This project focuses on analyzing NYC (New York City) civil job postings to explore trends, salary disparities, and the geographic distribution of job opportunities. By examining data sourced from NYC’s government job postings dataset, the project aimed to uncover patterns in job categories, salary structures, and temporal and spatial trends. The research questions addressed included identifying job categories with the highest and lowest salaries, understanding month-by-month variations in job postings, and mapping the geographic concentration of job postings.

**Research Question and Approach**

The primary research questions centered on which job categories offer the highest and lowest salaries, which keywords are most frequently associated with job postings, and how these postings are distributed over time and across geographic locations in NYC. To address these, the analysis began with data cleaning and preprocessing. Duplicate job postings were removed by retaining unique job IDs, and job location coordinates were merged using an external dataset. Challenges such as missing data and inconsistencies in job descriptions were addressed through filtering and normalization techniques.

The next step involved extracting keywords from the "Job Category" column. Each category was parsed to identify terms such as "Health," "Policy," and "Technology," allowing for an analysis of high-demand and niche areas. A dictionary-based approach quantified keyword frequencies, and bar charts visualized the top 10 most and least frequent keywords. Salary analysis followed, where the "Salary Range From" and "Salary Range To" columns were averaged for each job category. The results were visualized to highlight categories with the highest and lowest average salaries. Additionally, a temporal analysis examined monthly job posting volumes from 2021 to 2024, while a geographic analysis used latitude and longitude data to map job distributions across NYC.

**Visualizations and Shiny App**

Visualizations played a crucial role in this project. Bar charts revealed that "Health," "Policy," and "Analysis" were among the most frequently mentioned keywords, while niche categories such as "Green Jobs Technology" were among the least frequent. These insights were complemented by salary visualizations, which highlighted significant disparities across job categories. For example, roles in "Policy" and "Analysis" offered the highest average salaries, while niche categories tended to have lower salaries, indicating potential areas for policy intervention.

The temporal analysis used interactive line charts to show month-by-month job posting trends from 2021 to 2024. Peaks were observed in the first and fourth quarters of each year, likely corresponding to fiscal planning cycles. An interactive map created using Dash visualized the geographic distribution of job postings, with a focus on NYC's central areas. Users could filter job postings by keyword, allowing for dynamic exploration of spatial patterns and concentrations of job categories.

The Shiny app further enhanced interactivity by enabling users to select job categories from a dropdown menu and view corresponding job locations on a map. The app centered on NYC and allowed users to explore high-demand areas like "Health" or niche categories like "Green Jobs," providing a comprehensive view of job distributions.

**Policy Implications**

The findings have several important policy implications. First, the significant salary disparities across job categories highlight the need for targeted interventions to ensure equitable compensation. For example, lower-paying categories such as "Green Jobs Technology" and "Human Resources Social Services" could benefit from policy initiatives to attract and retain talent. The frequent use of keywords like "Health" and "Policy" suggests that these areas are critical to NYC’s workforce. Policymakers should consider workforce development programs and training initiatives to sustain and expand these high-demand sectors.

The geographic analysis revealed a concentration of jobs in Manhattan, with fewer opportunities in outer boroughs. This imbalance underscores the need for policies that promote job creation in underserved areas, ensuring equitable access to opportunities across the city. Additionally, the temporal trends in job postings suggest that government agencies could optimize recruitment efforts during peak hiring periods, ensuring that resources are aligned with applicant demand.

**Future Directions**

While this project provided valuable insights, there are several opportunities for future work. Addressing missing data, particularly in job location coordinates, could enhance the accuracy of geographic analyses. A deeper dive into sector-specific trends, such as analyzing the impact of automation on job categories like "Technology," could provide actionable insights for policymakers. Incorporating applicant demographic data would allow for an examination of diversity and equity in hiring practices, helping to identify and address systemic disparities.

Real-time monitoring of job postings could enable dynamic policy responses to emerging labor market trends. Additionally, exploring longitudinal data on job retention and satisfaction could complement the current analysis, offering a more holistic view of NYC’s labor market. Future work could also investigate how external factors, such as economic downturns or pandemics, influence job postings and workforce trends.

**Conclusion**

In conclusion, this project shed light on key aspects of NYC’s civil job postings, including salary disparities, keyword trends, and geographic distributions. By combining robust data analysis with interactive visualizations, it highlighted areas for policy intervention, such as addressing salary inequities and promoting geographic equity in job opportunities. The findings underscore the importance of data-driven approaches in shaping labor market policies and ensuring a more inclusive and equitable workforce in NYC. Future research can build on these insights to address emerging challenges and optimize workforce development strategies.