Title

Global Trends and Forecasts in Life Expectancy

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Abstract

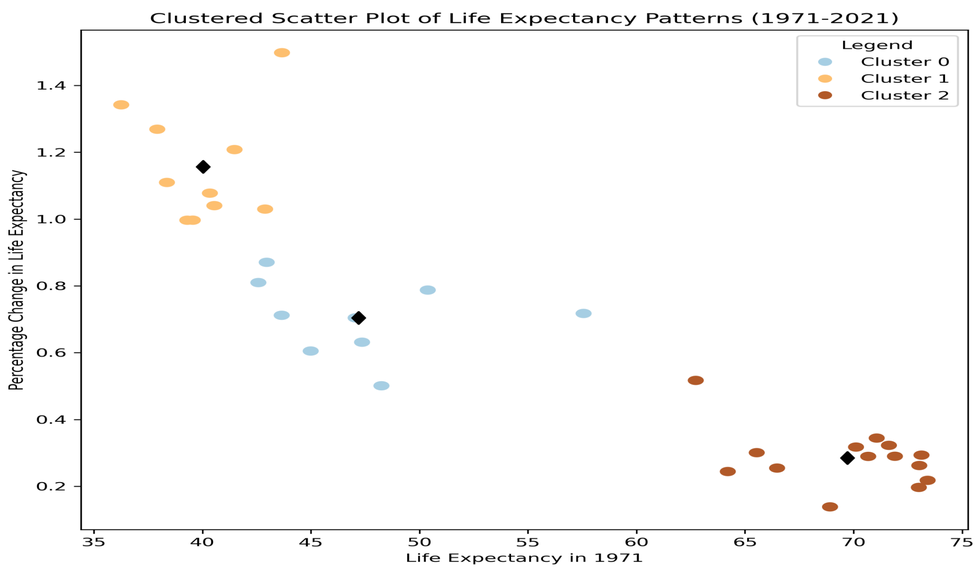
This analysis examines historical and projected future trends in life expectancy across countries using data from 1971-2021. Clustering and exponential growth modeling techniques are employed to categorize countries and generate forecasts to 2051

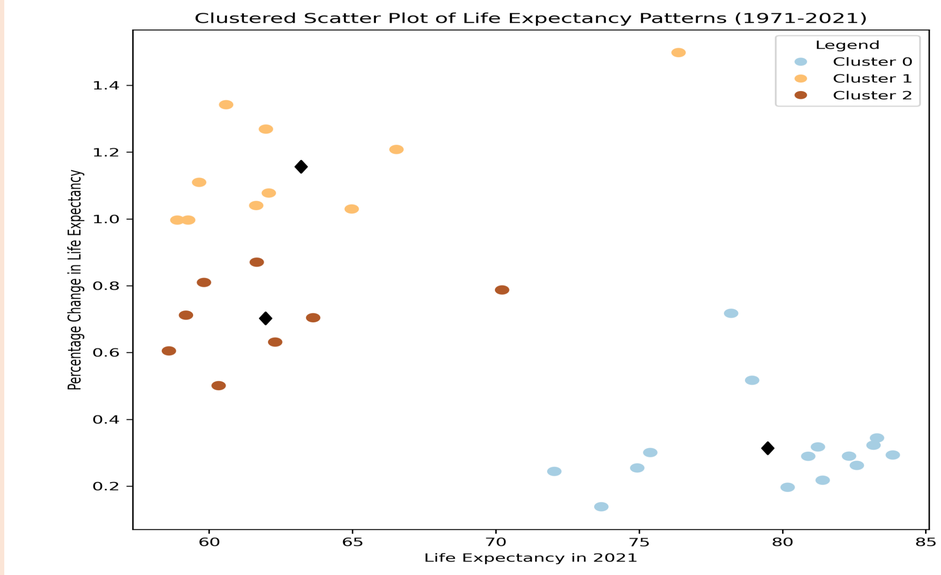
Introduction

Life expectancy is a key population health indicator and understanding its evolution and future patterns can inform public health planning. This analysis aims to identify clusters of countries with distinct life expectancy trends over the past 50 years and model future trajectories.

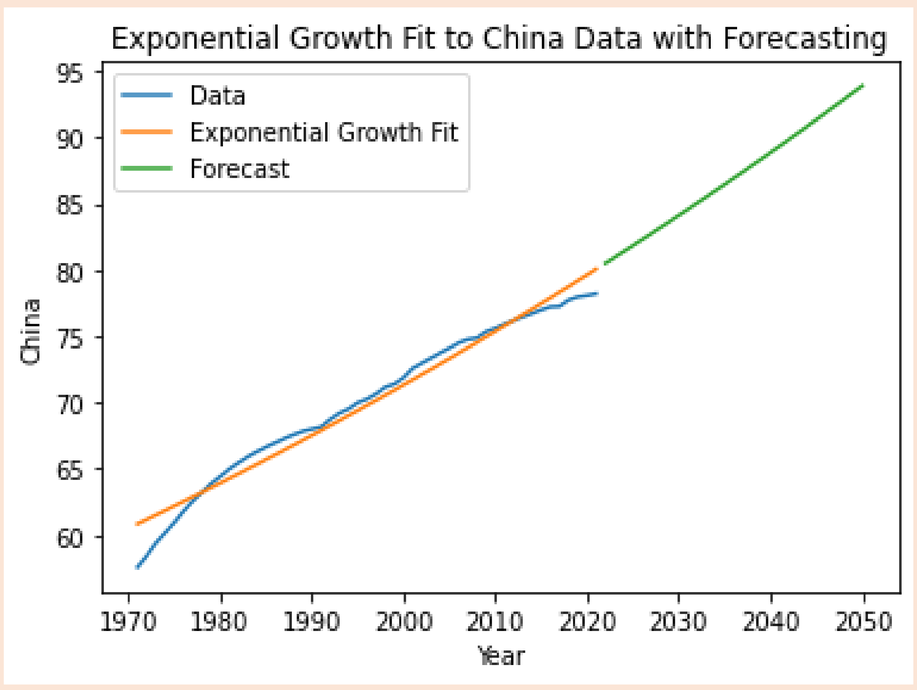
Methodology

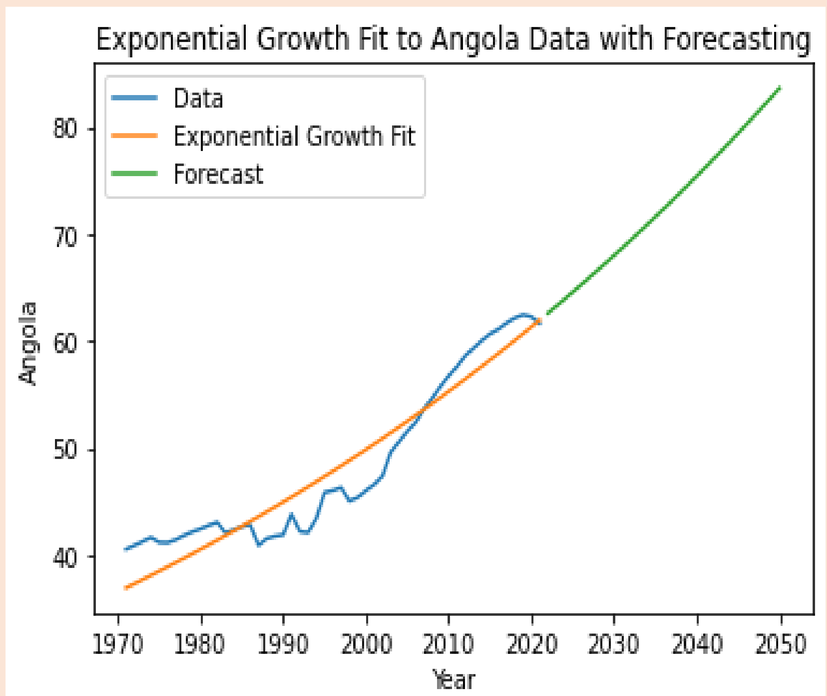
The dataset spanned annual life expectancy for countries over 1971-2021. Data cleaning prepared the multivariate time series for analysis. Countries were grouped into 3 clusters by 1971 expectancy and 50-year change using k-means methodology. Exponential curves were fitted and leveraged for forecasts to 2051 for China, Angola, and Switzerland.

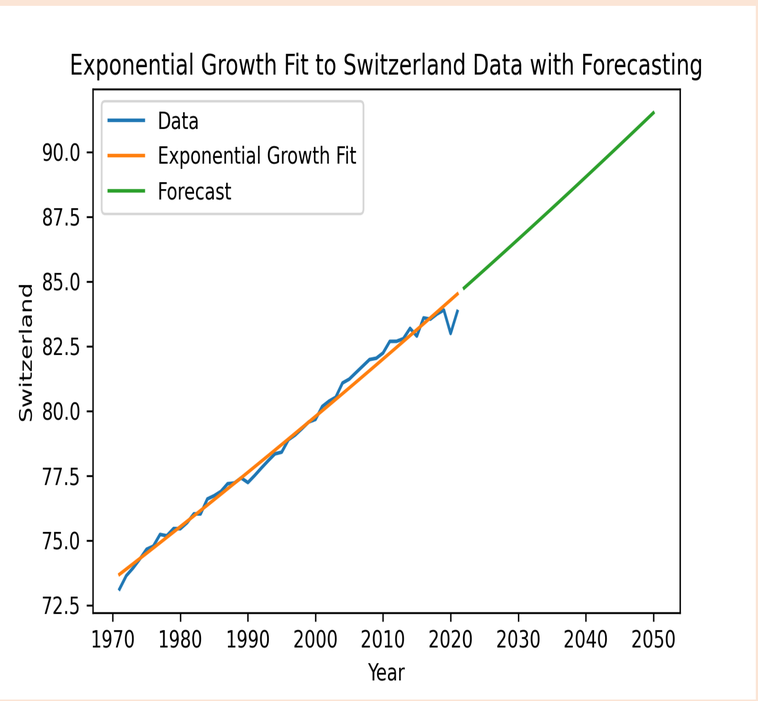




Over the decades, some countries in Cluster 0 transitioned to higher initial life expectancies with minimal subsequent changes, possibly due to reaching a plateau in achievable life expectancy.. Countries in Cluster 1 sustained efforts to address health challenges and promote healthcare access, resulting in ongoing positive trends in life expectancy. Countries in Cluster 2 maintained steady progress in life expectancy, suggesting sustained efforts in healthcare and development without significant shifts.







Using one country from each of the 3 clusters for fitting., Angola was chosen for cluster0,China was selected from Cluster2 and Switzerland was chosen from cluster 1. The models forecast China reaching 83 years by 2051. Angola underwent immense growth, rising from 40 to a projected 73 years. Switzerland's projections suggest a more stable trajectory, with life expectancy estimated to be around 86.87 in 2031, 89.29 in 2041, and 91.77 in 2051. The lower growth rate indicates a more gradual increase compared to China and Angola.

Conclusion

This analytics presents a rigorous data science exploration of global life expectancy trends, providing valuable insights into patterns and potential future trajectories. The methodologies employed contribute to the broader discourse on public health, fostering informed decision-making in addressing global health challenges. The analytics quantified uneven global longevity gains. Clustering spotlighted which countries have lagged to inform policy priorities. The exponential models enabled reasonable forecasts for health infrastructure planning. This framework can be extended to additional health indicators. Ongoing modeling with socioeconomic data could reveal explanatory factors behind divergence.

Ufelicita/ADS1-ASSIGNMENT3: Clustering and Data fitting assignment (github.com)