

Understanding Debt Service Patterns: Clustering and Forecasting

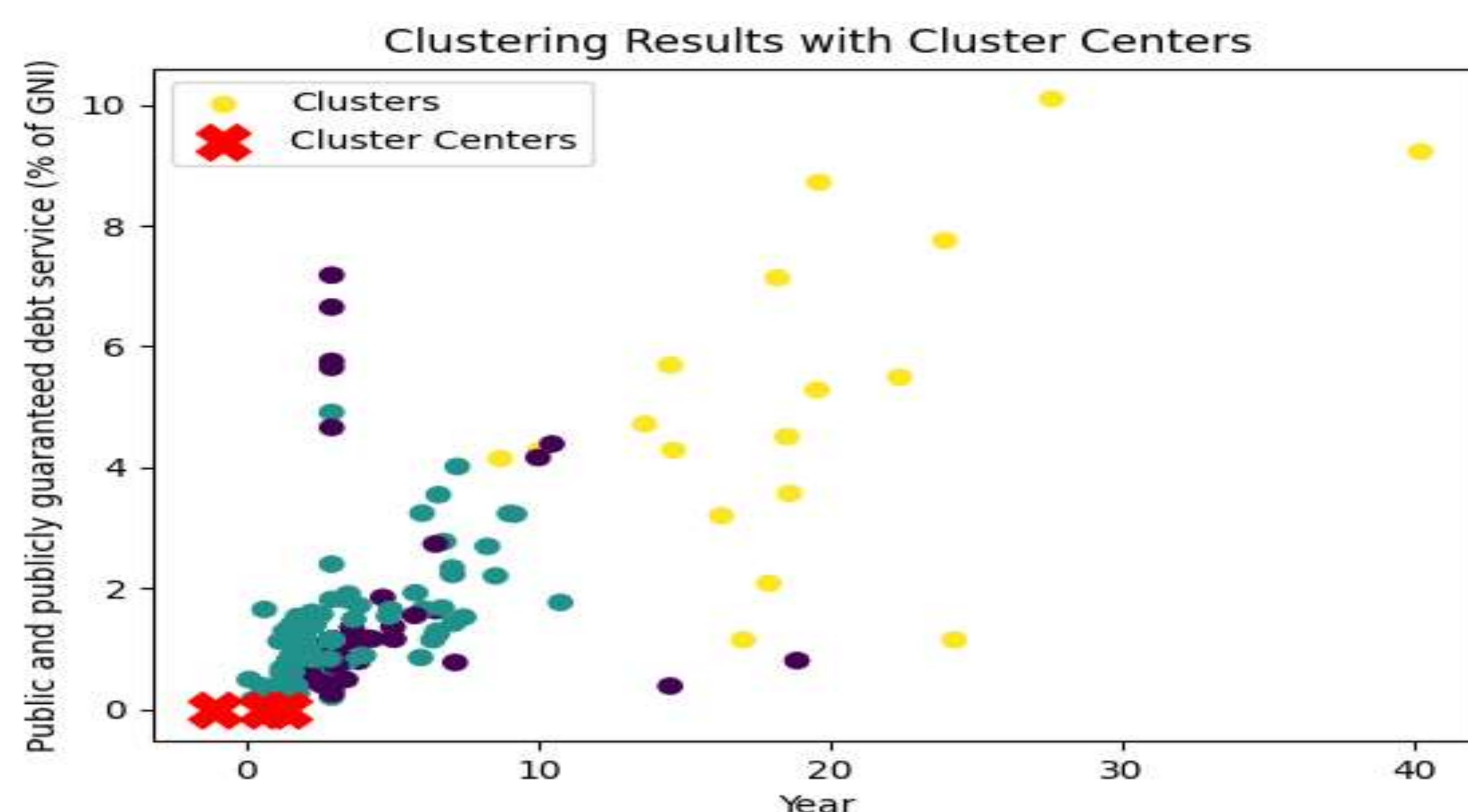
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Introduction:

- Background : Exploring the relationship between debt service and economic indicators.
- Objective : Utilize clustering and curve fitting to gain insights and forecast debt service trends.

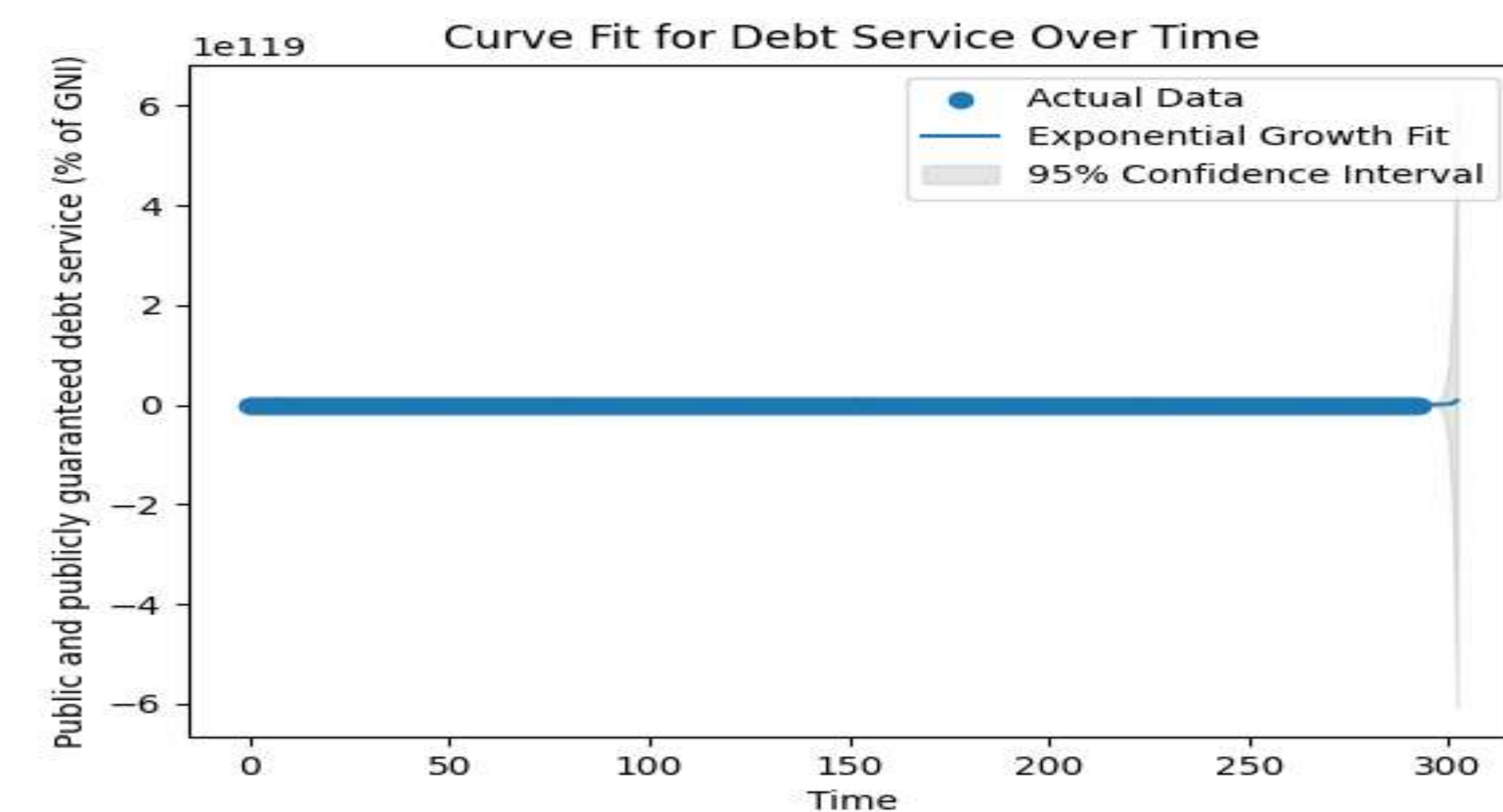
Clustering Analysis

- Data Exploration:
 - Investigated unique values in each column.
 - Replaced non-numeric values with NaN and then filled NaN with column medians.
- K-Means Clustering.
 - Selected key indicators for clustering: Forest area, Debt service, Public debt service, Present value of external debt.
 - Applied K-Means clustering with k=3 clusters.
 - Normalized data for better clustering results.
- Visualisation.
 - Plotted clusters in 2D space using Debt Service and Public Debt Service.
 - Highlighted cluster centres for reference.
- Silhouette Score.
 - Calculated Silhouette Score for evaluating clustering performance.
 - Score: 0.5273163391715121



Curve Fitting and Prediction

- Curve Fitting:
 - Extracted time and debt service data.
 - Modelled debt service growth using the exponential growth function.
- Curve Fit Visualisation:
 - Plotted actual debt service data and fitted curve.
 - Displayed a 95% confidence interval around the curve fit.
- Prediction for 2024:
 - Predicted debt service values for the year 2024 using the fitted curve.
- Predictions for Specific Countries:
 - Selected countries (United Kingdom, Uruguay, Uzbekistan, United States).
 - Displayed the predicted debt service values for these countries in 2024.



Country	Predicted_Debt_Service_2024
United Kingdom	5.605904e+128
Uruguay	5.685904e+128
Uzbekistan	5.705904e+128
United States	5.905904e+128

Conclusion:

The analysis reveals distinct clusters of countries based on selected indicators and predicts future values for debt service. These insights can inform policymakers and stakeholders in understanding trends and making informed decisions.