

PORTFOLIO PRESENTATION

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28/ JANUARY, 2026



P6 - Two Paths, One Migration Story : Case of Germany



Business Challenge

Discover and anticipate migration flows and dynamics to adapt integration policies, infrastructure and the labor market.

Analysis objective

The objective of the analysis is to explore and understand migration dynamics in Germany by distinguishing the behavior of Germans of foreign origin and foreigners from an entry and exit point of view in order to anticipate future flows and inform strategic decisions in economic planning.

Data overview

Source: open-source dataset (2000-2024) comes from Destatis – Statistisches Bundesamt, the official Federal Statistical Office of Germany. It contains entry and exit of Germans and foreigners and associated migratory balance and country.

Metric: Number of people entering/exiting Germany per year

Rows : Over 2900 rows

Cleaning data

To ensure a reliable analytical foundation, I cleaned the migration dataset using the techniques required. This consistent data-quality process was applied throughout the project—including supervised and unsupervised modeling and spatial analysis—to maintain accuracy and comparability across all stages.

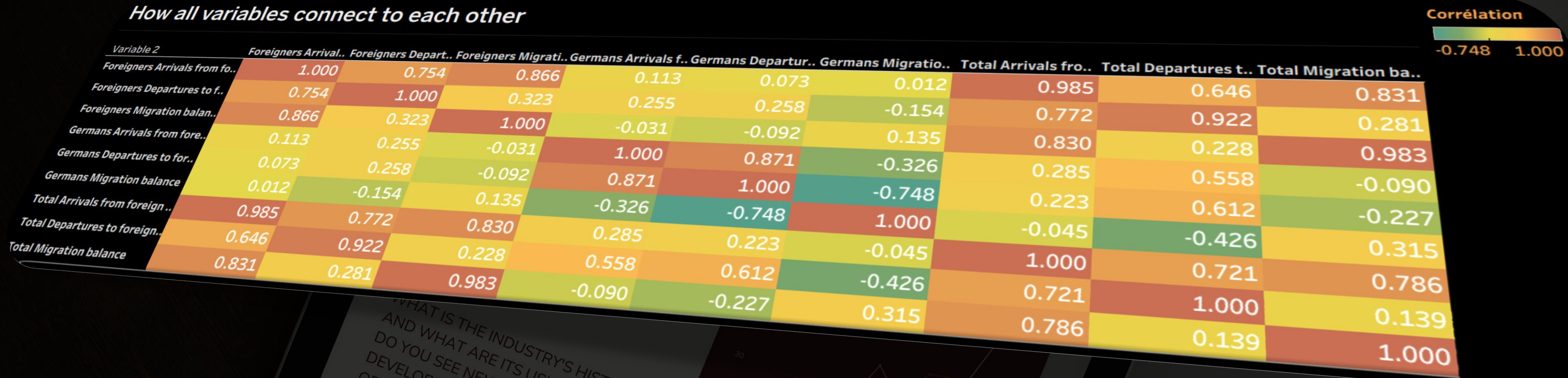
Analytical Approach

The project combines descriptive analysis, geographic visualization, correlation checks, machine learning regression, and a SARIMA model to understand migration patterns and forecast future trends.



ANALYSIS & INSIGHTS

How all variables connect to each other



Correlation analysis in Python highlights a clear divide between Germans and foreigners: their migration patterns differ sharply. Foreigners show strong long-term stability in Germany, whereas Germans display significantly higher mobility. The most notable contrast comes from departures—German outflows heavily influence their migration balance, while departures among foreigners have minimal impact.

One insight dominates the whole picture: foreigners are the primary contributors to Germany's positive migration momentum, while Germans consistently show a stronger tendency to leave.

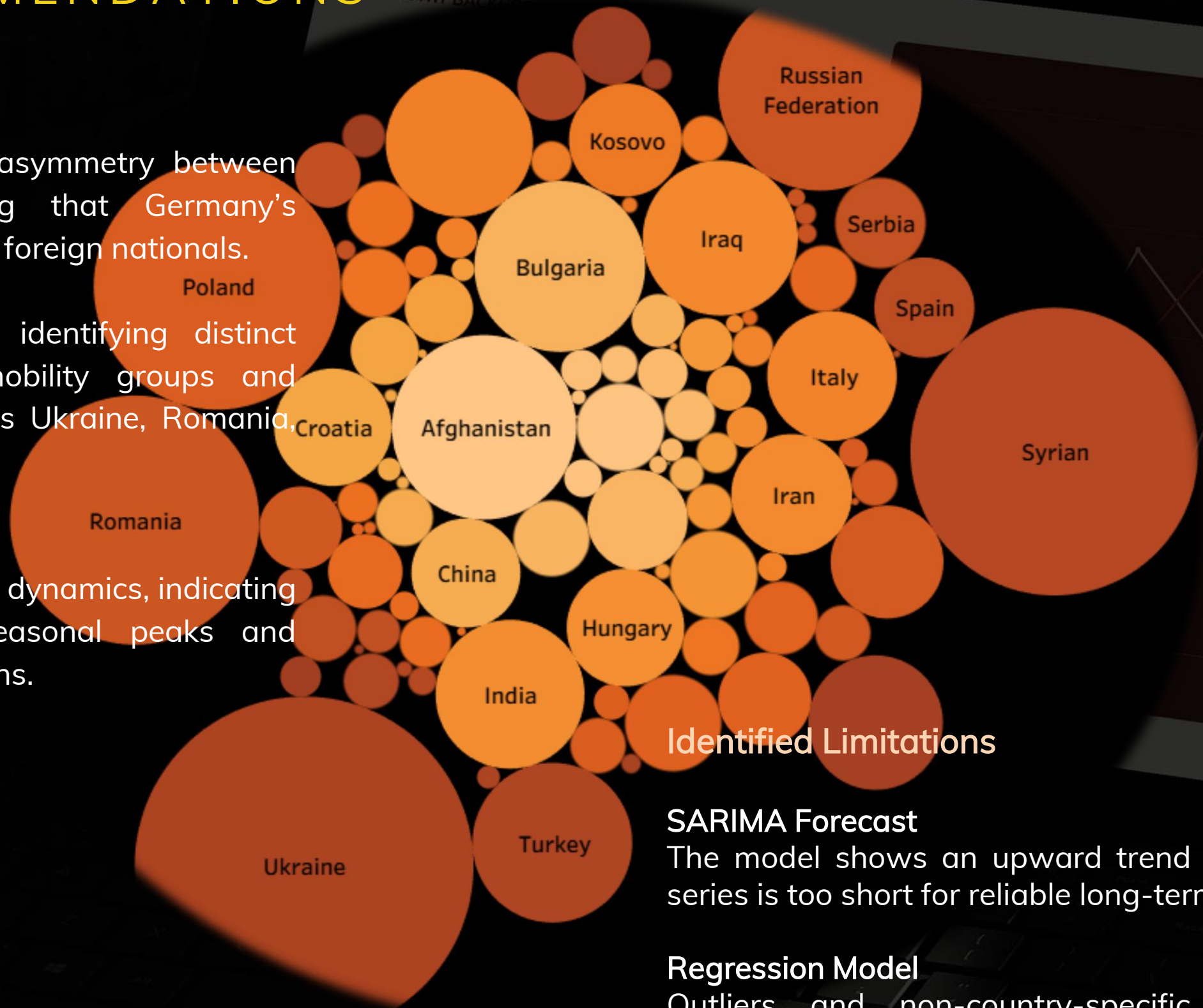
FINDINGS & RECOMMENDATIONS

Summary

Exploratory analysis revealed a clear asymmetry between Germans and foreigners, suggesting that Germany's migration momentum is largely driven by foreign nationals.

Clustering reinforced this insight by identifying distinct migration profiles, highlighting low-mobility groups and isolating high-balance countries such as Ukraine, Romania, Bulgaria, Afghanistan, and Turkey.

The SARIMA model then projected future dynamics, indicating an upward migration trend with seasonal peaks and increasing uncertainty over longer horizons.



Identified Limitations

SARIMA Forecast

The model shows an upward trend with seasonal peaks, but the 25-year series is too short for reliable long-term forecasts, increasing uncertainty.

Regression Model

Outliers and non-country-specific numerical entries weaken model performance and reduce interpretability.

Dataset Structure

Missing country identifiers limit geographic analysis and obscure regional migration patterns.

To see more





Strengths Demonstrated

I had many options to choose from, with several projects and questions I constantly ask myself. I was particularly curious to explore the dynamics of migration in Germany, and I managed to uncover valuable insights into these questions



Moment of struggle

Among the various challenges I faced, sourcing the dataset was one of the biggest. I was worried that I wouldn't be able to find what I needed within a reasonable timeframe while still meeting all the criteria required by the instructions. Fortunately, I managed to find the right dataset in record time

Another major challenge was the time-series analysis. I tested many models and tried different approaches to obtain an acceptable forecast: adjusting the variables (lags), modifying the forecasting horizon, regrouping the data to stabilize the series, and more. Despite these efforts, I believe there are still many methods to explore in order to further improve the quality of the predictions

INDUSTRY BACKGROUND



What Comes Next

I'm planning to apply Clustering with python by Creating new segments from client database in order to be able to serve customers specific to their needs.



Final Thoughts

I'm very happy and proud to have carried out this project from sourcing the dataset all the way to visualizations and insights using advanced analytics. Completing this end-to-end process makes me confident in my ability to take on more complex projects and contribute effectively in a professional environment

WHAT IS THE INDUSTRY'S HISTORY AND WHAT ARE ITS USUAL TRENDS? DO YOU SEE NEW PATTERNS DEVELOPING? GIVE A PREDICTION OR OUTLOOK ABOUT WHERE THE INDUSTRY IS HEADED.

FINANCIAL OUTLOOK

