Data Engineering 1: SQL and Different Shapes of Data
Term Project 2

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Introduction

- Machine learning algorithm to predict happiness score of the countries
- Data sources enriched by APIs
- Knime, low-code data analytics tool, as the central platform

Data Sources

- Yearly data of 'World Happiness Report' from 2015 to 2023 retrieved from Kaggle
  - Variables include happiness rating, gdp per capita, social support, health life expectancy, freedom to make life choices and perception of corruption
  - Hosted in AWS RDS
- World Bank data
  - Variables include unemployment percentage, urban population percentage and internet access percentage
  - Present as stand alone csv file
- Eurostat APIs
  - Standardised house price-to-income ratio, Pollution, Population, Mobile internet traffic
  - Accessed and merged in KNIME

ETL Processes

- wrangling csvs in s3 using Sagemaker and hosting output in RDS
- using string replacer in Knime to ensure data compatibility across data sets
- Python script and HTML query for integration of API
- normalization variables
- handling missing data

Happiness Distribution by Year

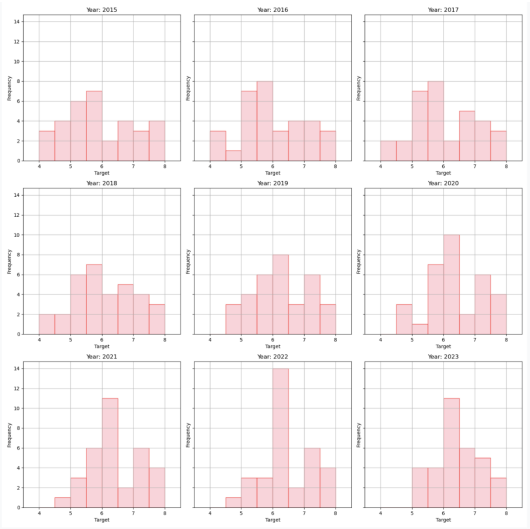
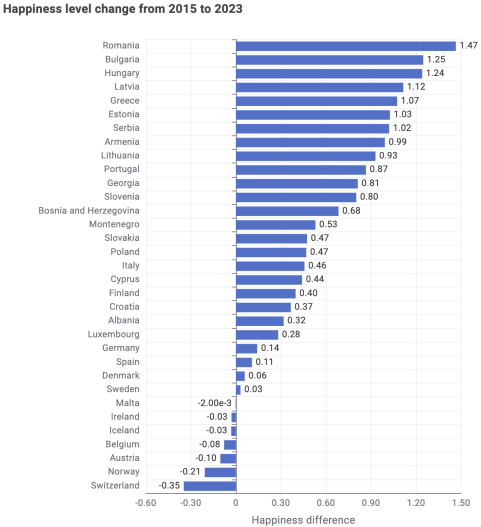
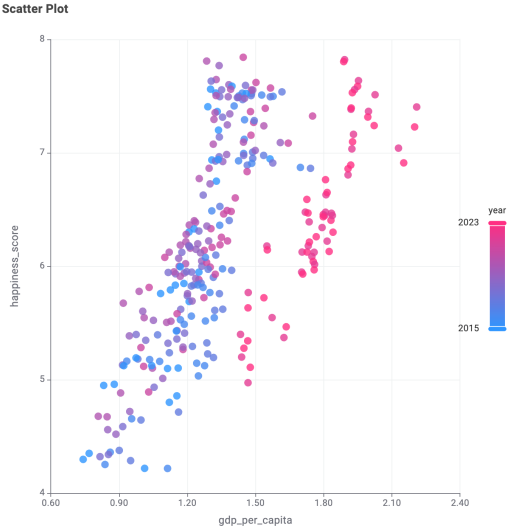


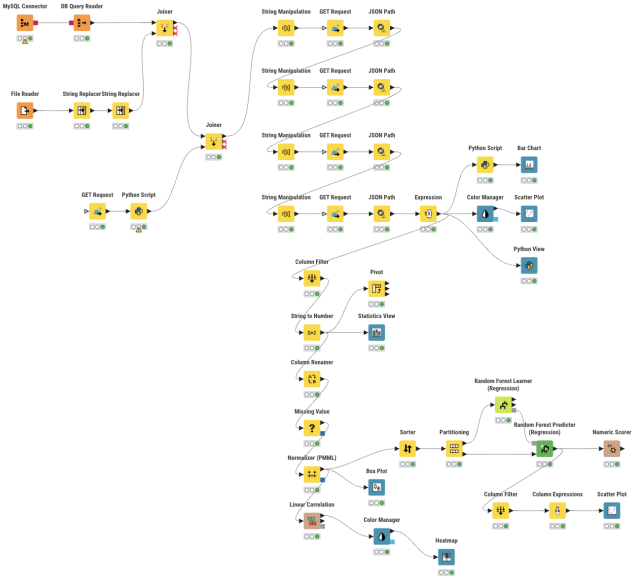
Figure: Histograms for happiness per year

More Visual Analysis





KNIME

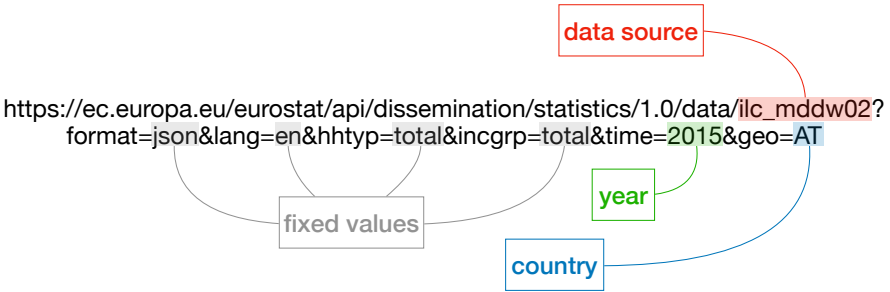


to the Knime extensions

to the normalized variables

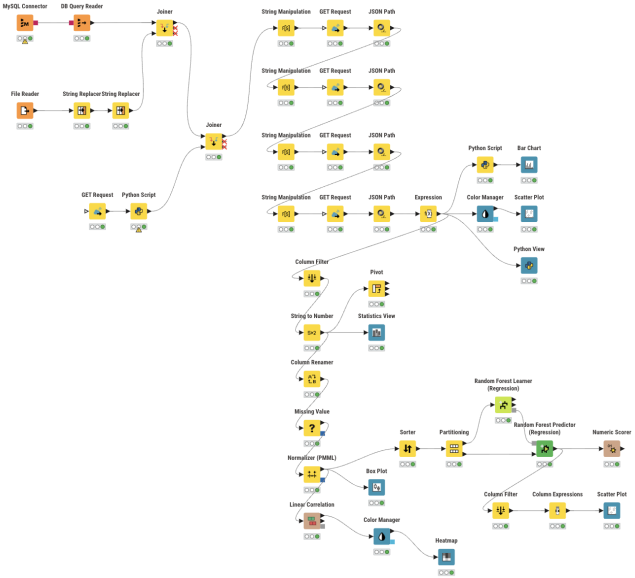
to the heatmap

API requests



- API request structure based on a specific example

KNIME



to the Knime extensions

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Normalization of variables

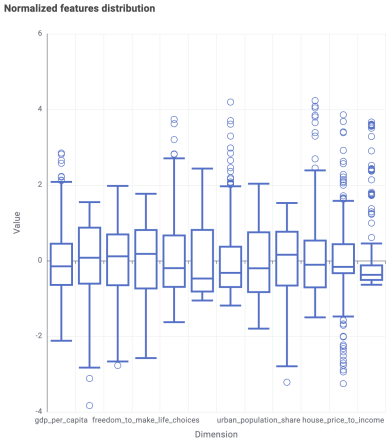

Figure: Normalized features

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Random Forest

RowID	Prediction (happiness_score) *Number (double)*
R^2	0.729
mean absolute error	0.296
mean squared error	0.131
root mean squared error	0.362
mean signed difference	0.015
mean absolute percentage error	0.047
adjusted R^2	0.729

Figure: Statistics of predicted outcome

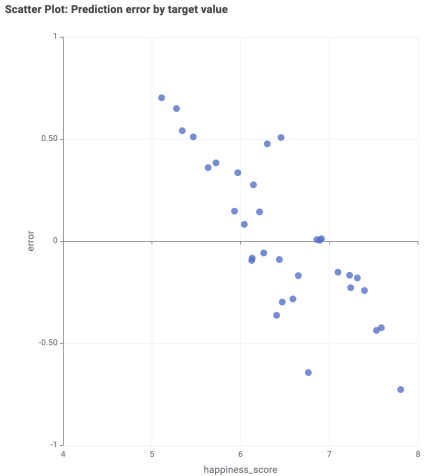

Figure: Prediction errors

Conclusion

- Diverse data sources: World Happiness Report 2023, World Bank, Eurostat APIs
- Data processing with AWS and careful ETL process in Knime
- "Random Forest Model" as machine learning algorithm to predict the last year of the available data
- Test on the actual data

References

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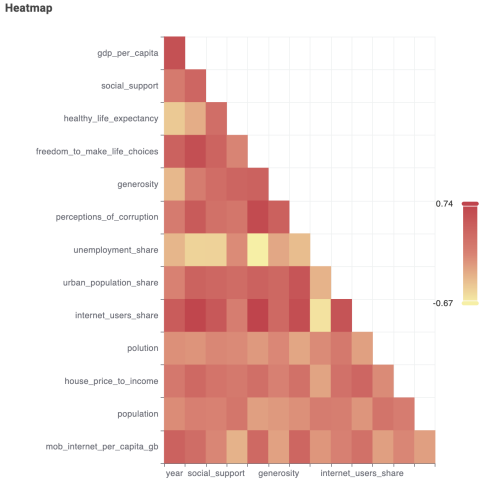
Knime Extensions & GitHub link

- KNIME Database Extension
- KNIME Python Script Extension
- GitHub Repository to our project

Appendix



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