Food in the EU

Exercise 2

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Data collection

Trade (Import/export) dataset:

https://www.fao.org/faostat/en/#data/TCL (Food and Agriculture Organization of the UN)

Life expectancy dataset:

https://ec.europa.eu/eurostat/databrowser/view/demo_mlexpec/default/bar?lang=en (EUROSTAT)

GDP per capita dataset:

https://ec.europa.eu/eurostat/databrowser/view/sdg_10_10/default/table?lang=en (EUROSTAT)

Food consumption dataset:

https://www.efsa.europa.eu/en/microstrategy/food-consumption-survey (European Food Safety Authority)

Obesity dataset:

https://ec.europa.eu/eurostat/databrowser/view/ilc_hch10/default/table?lang=en (EUROSTAT)

Diebetes dataset:

https://diabetesatlas.org/data/en/indicators/2/ (International Diabetes Federation)

Food and Agriculture Organization of the United Nations

International Diabetes Federation

eurostat

efsa EUROPEAN FOOD SAFETY AUTHORITY

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Data collection

- Most datasets are full of missing values
- Inconsistent naming between datasets from the same source
- Unclear definitions of variables
- Different time periods or frequencies
- Varying units of measurement

International Diabetes Federation

Food and Agriculture Organization of the United Nations

eurostat

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Final datasets after preprocessing

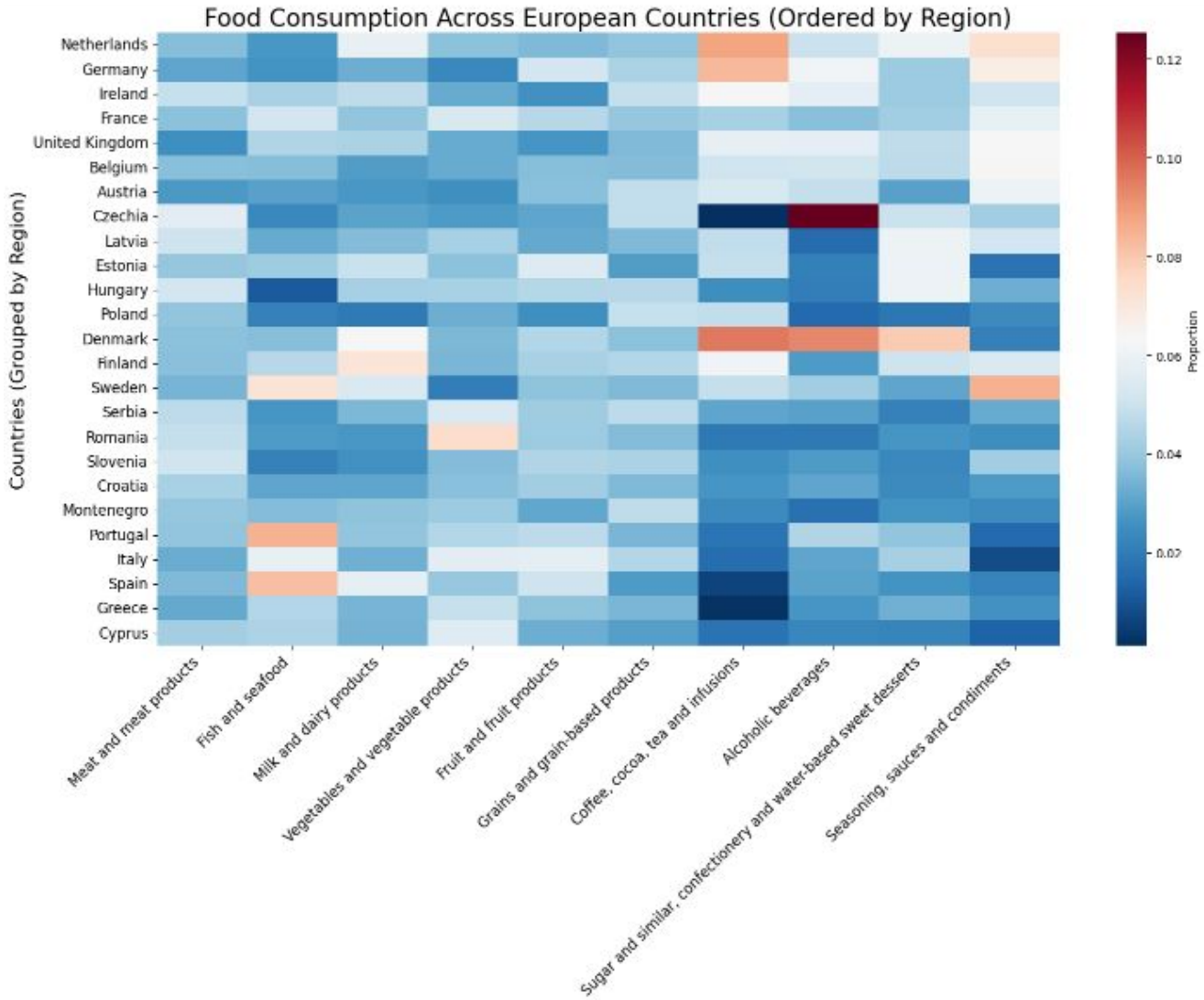
1. Food Consumption, Diabetes, and Obesity in the EU

- What are differences and similarities in food consumption/diets across European countries and regions?
- What types of foods are mainly exported/imported in a specific country?
- How import and export will change over time for each country?
- Is there a relationship between the GDP per capita and food consumption?

2. Import/Export, GDP per Capita and Life Expectancy in Europe

- Is there a relationship between the GDP per capita and the amount and type of food exported/imported?
- Is there a relationship between the obesity rate and food consumption?
- Is there a relationship between the diabetes prevalence and food consumption?
- Is there a relationship between the life expectancy and food consumption?
- Can we predict GDP per capita and life expectancy based on import/export values?

What are differences and similarities in food consumption/diets across European countries and regions?



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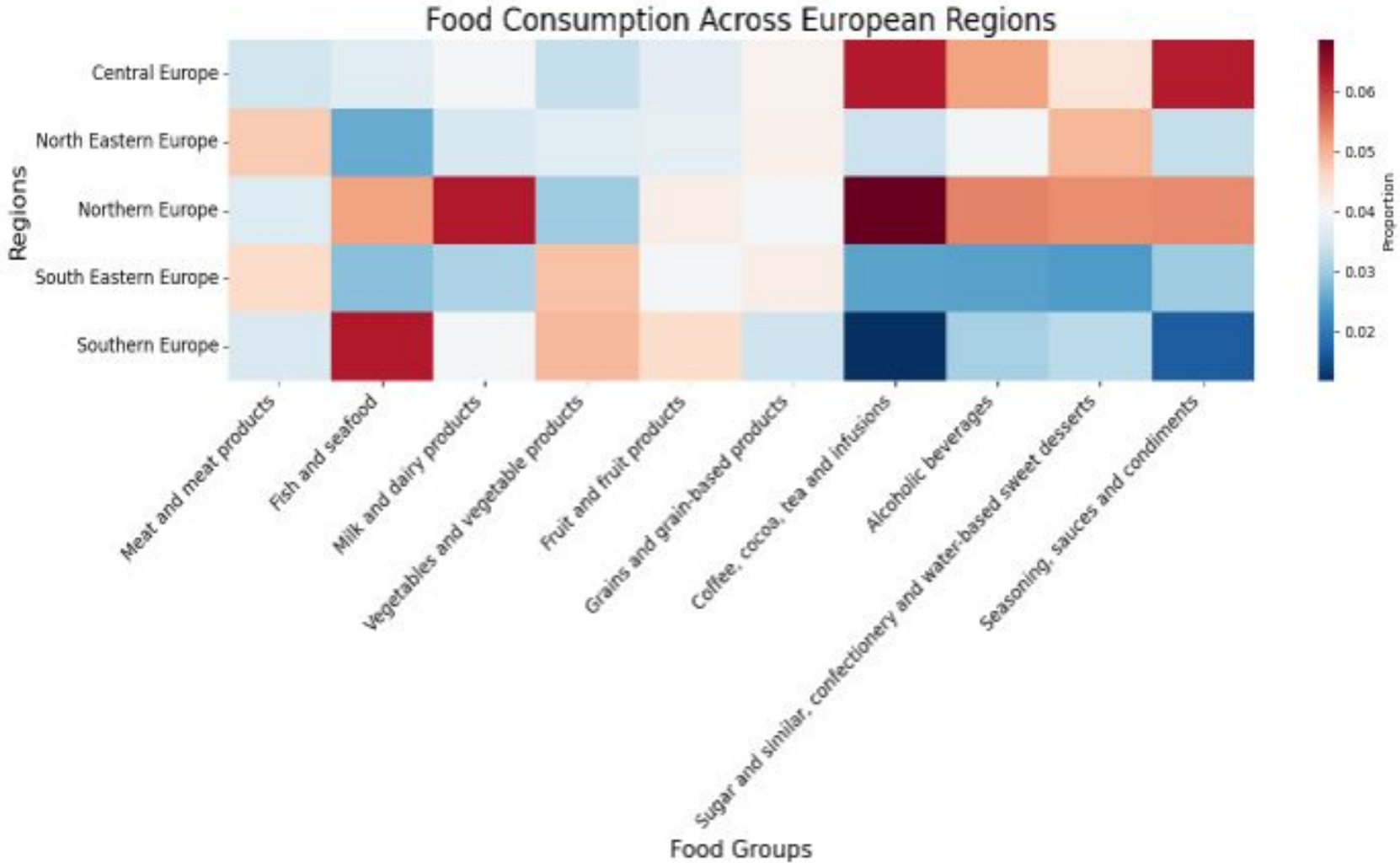
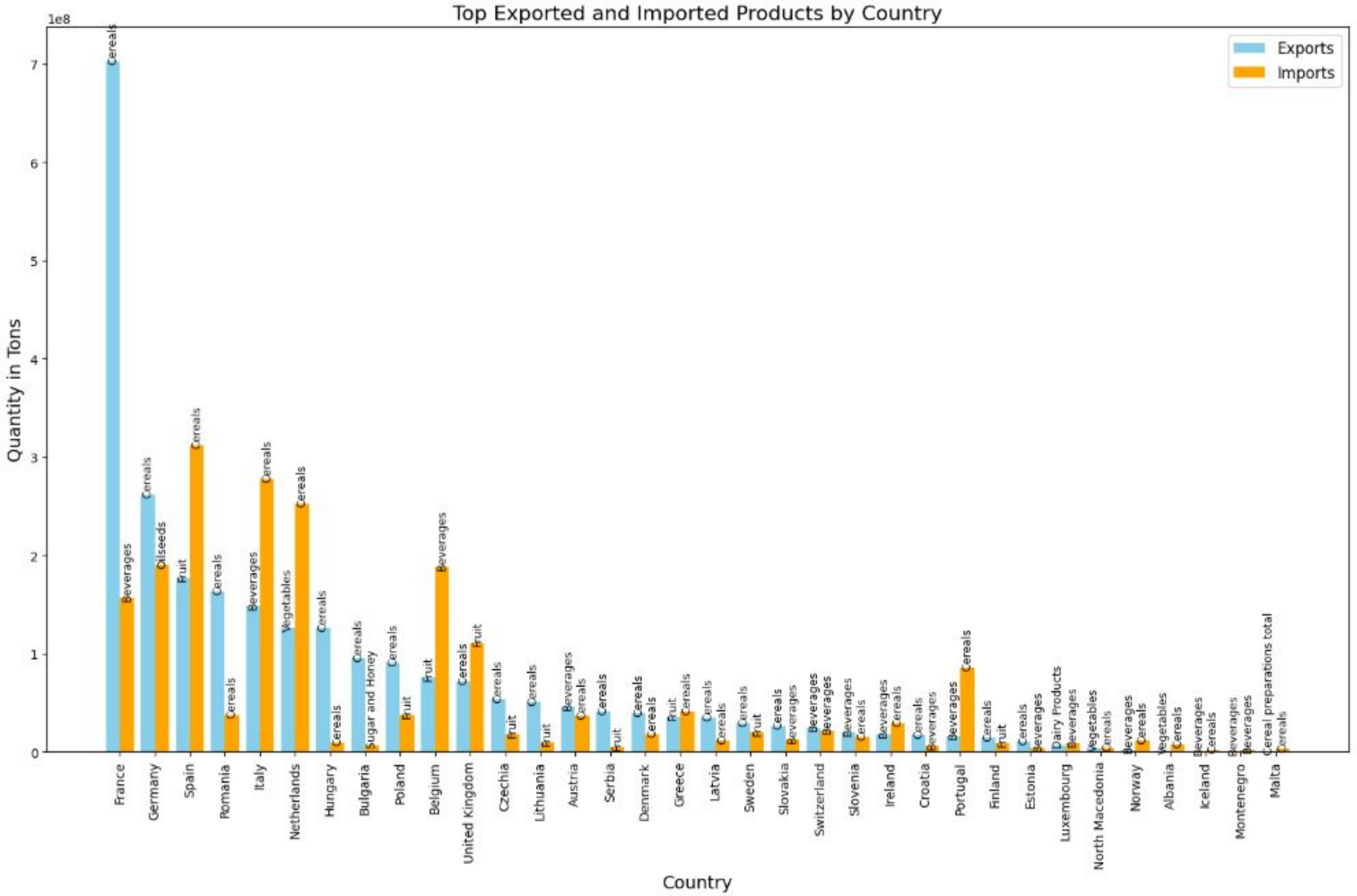
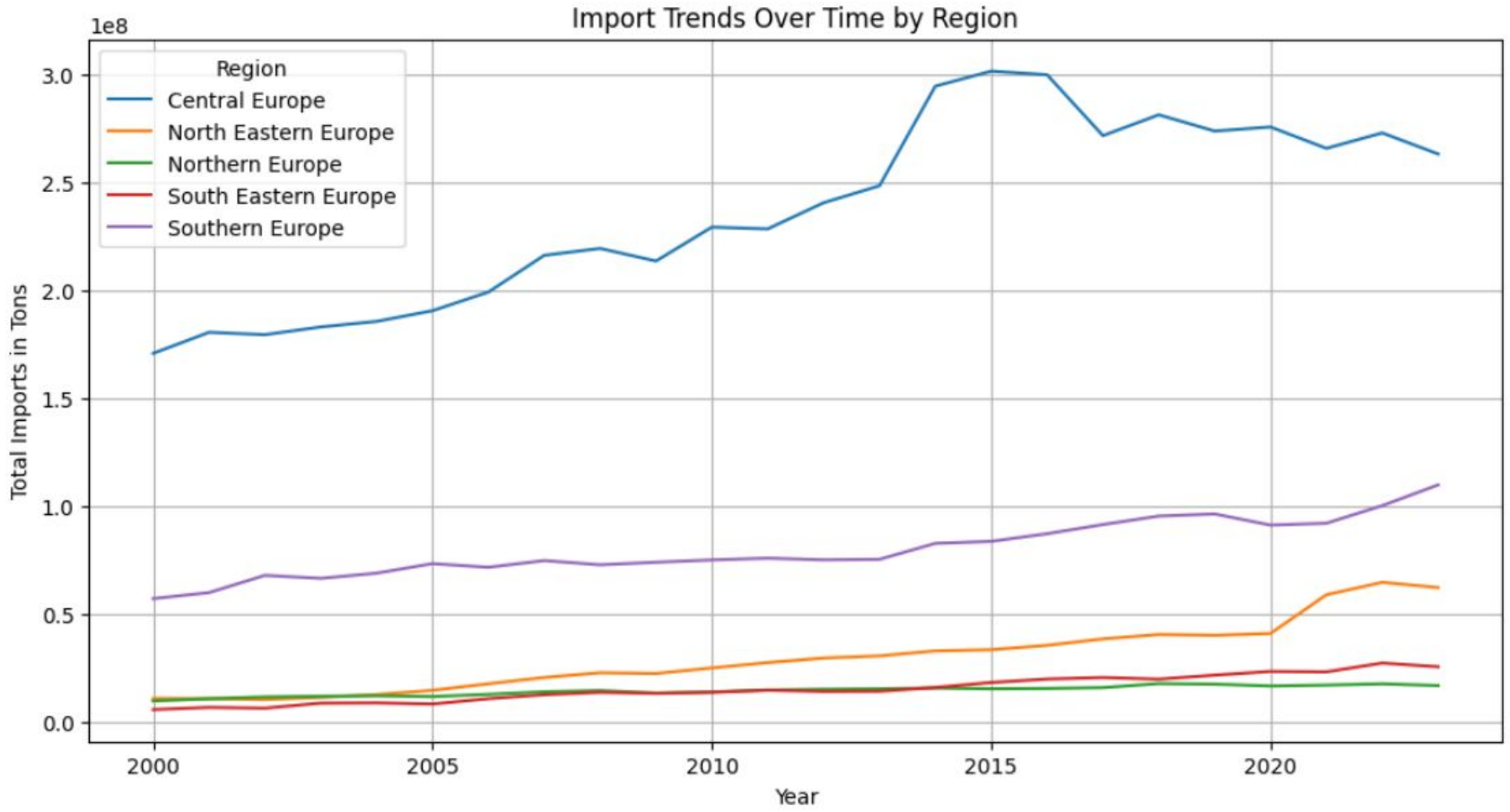
What are differences and similarities in food consumption/diets across European countries and regions?



What types of foods are mainly exported/imported in a specific country?



How import and export will change over time for each country?



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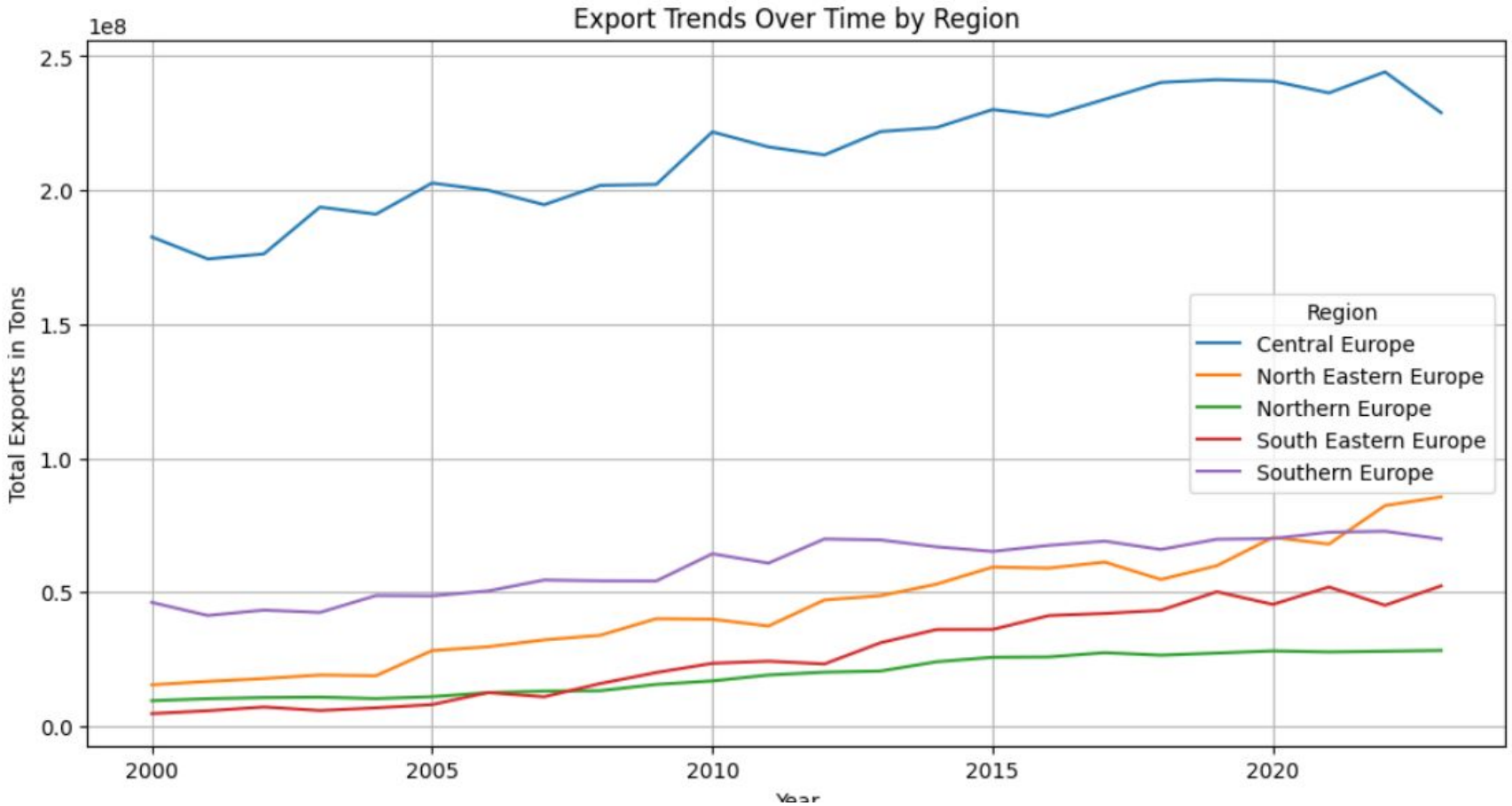
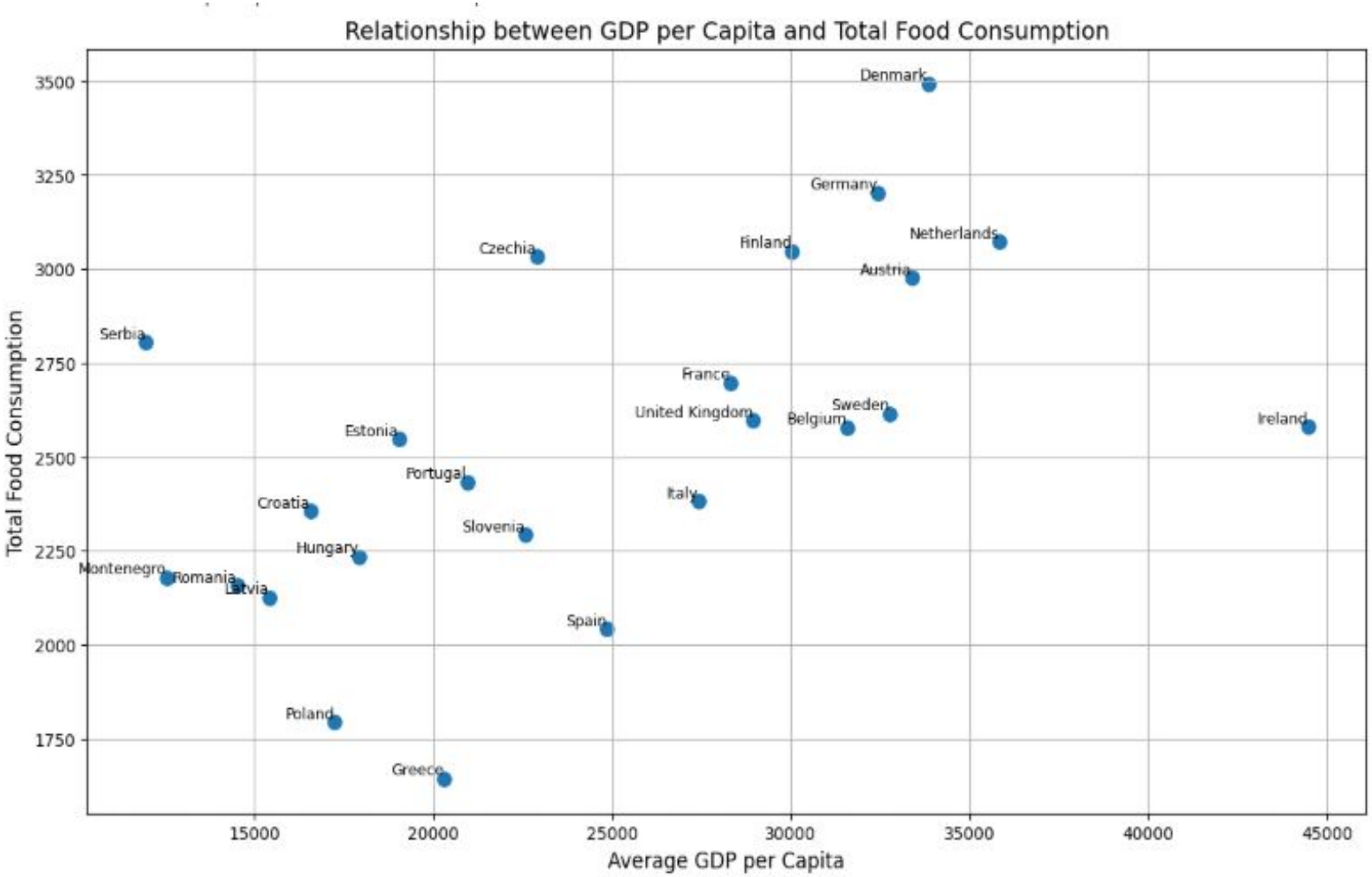
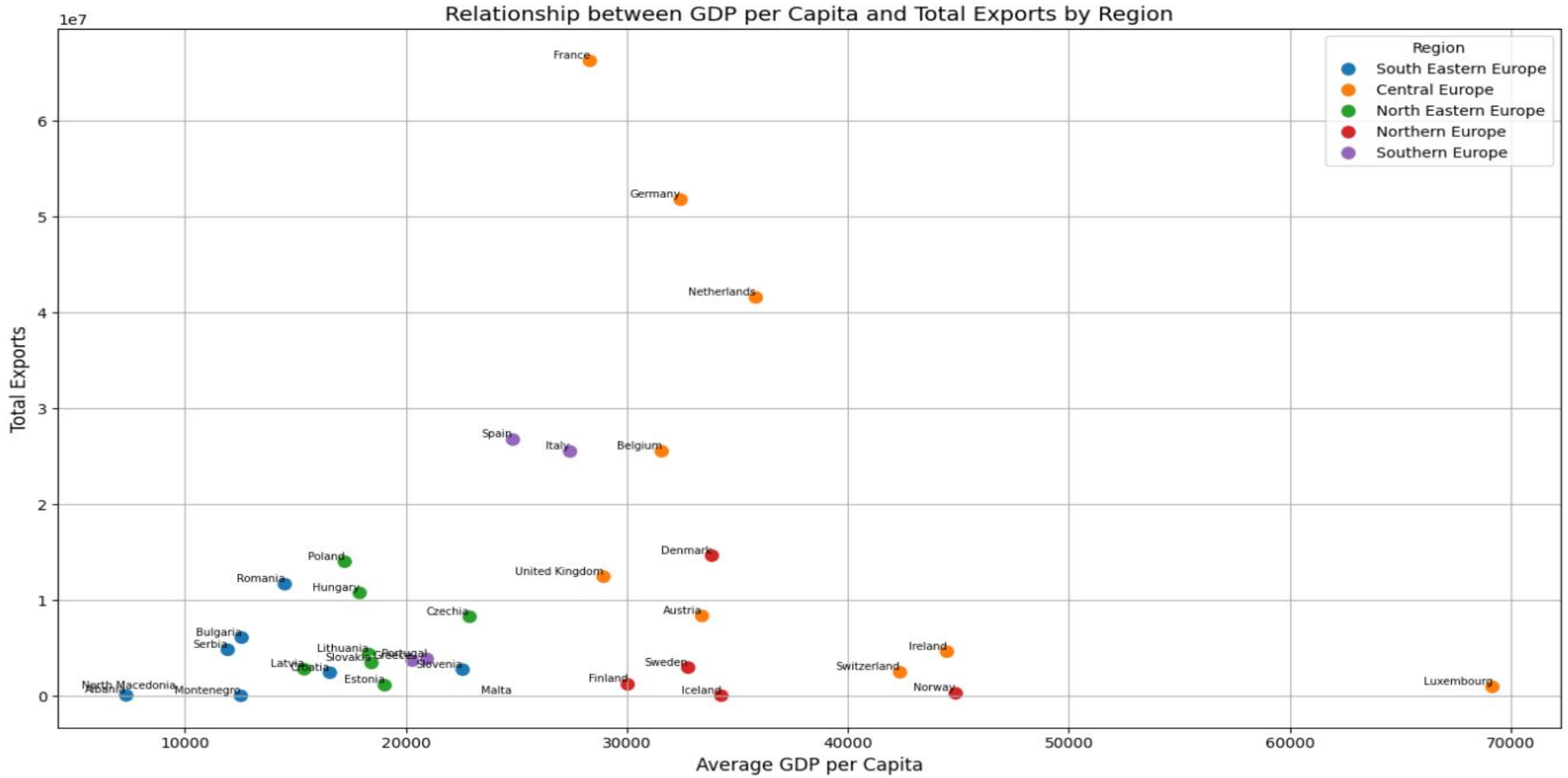


Is there a relationship between the GDP per capita and food consumption?



Is there a relationship between the GDP per capita and the amount and type of food exported/imported?



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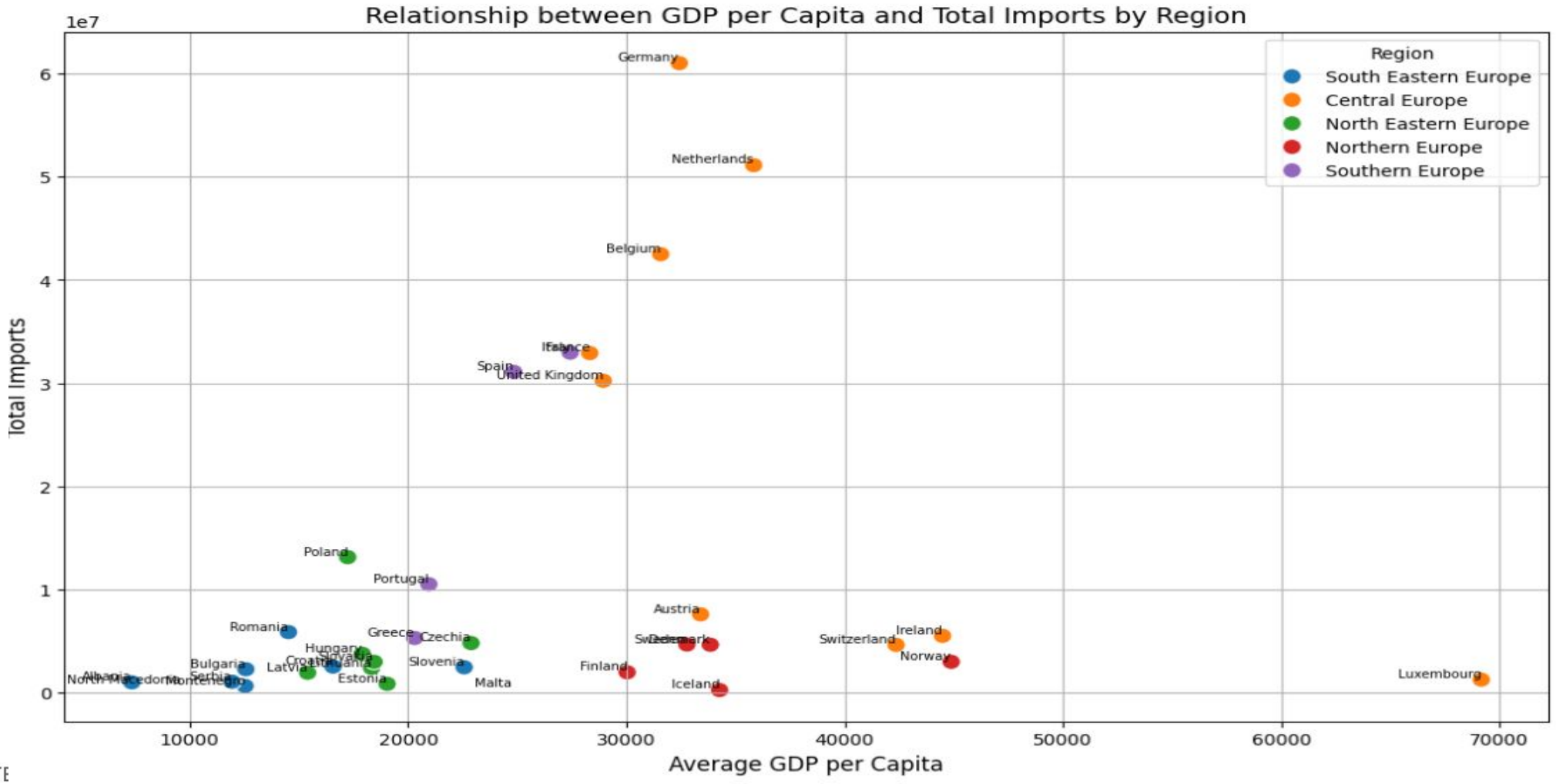

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Is there a relationship between the obesity rate and food consumption?

- Random Forest Regression on Obesity Rate with Food Consumption/Type as predictors
- ~4.3 RMSE

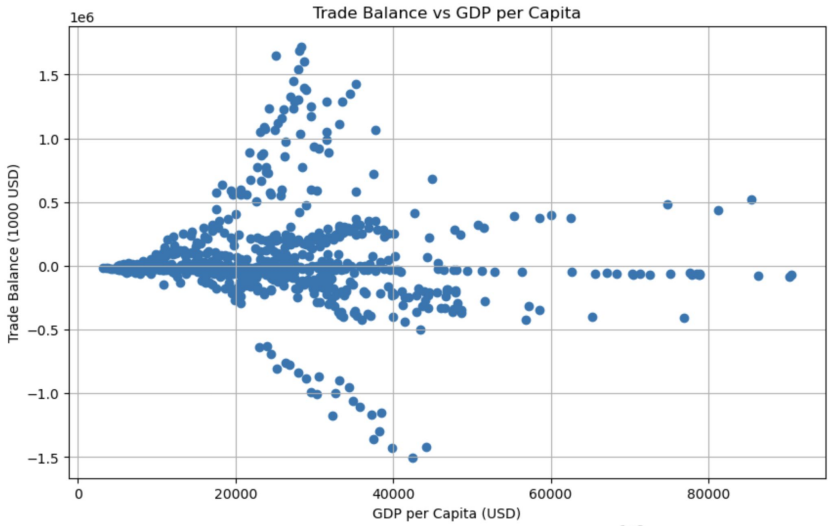
Feature	Importance
Coffee, cocoa, tea and infusions	0.49518
Sugar and similar, confectionery and water-based sweet desserts	0.35000
Vegetables and vegetable product	0.05482
Milk and dairy products	0.05000

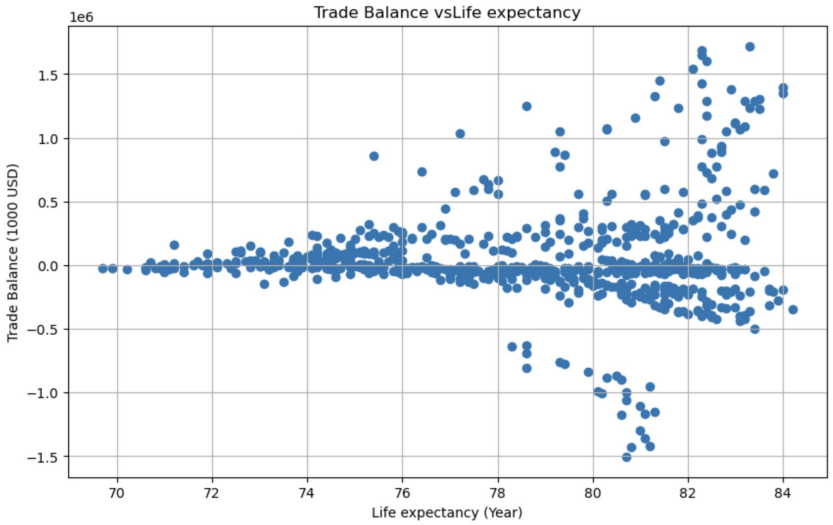
Is there a relationship between the life expectancy and food consumption?

- Random Forest Regression on Life Expectancy with Food Consumption/Type as predictors
- ~2.3 RMSE

Feature	Importance
Alcoholic beverages	0.512854
Eggs and egg products	0.217749
Fruit and vegetable juices and nectars	0.064697
Meat and meat products	0.048569
Vegetables and vegetable products	0.046633

Can we predict GDP per capita and life expectancy based on import/export data?





Model selections from Scikit-learn
- Linear Regression
- Random Forest Regressor
- Gradient Boosting Regressor
- Support Vector Regression

Metrics
- R-squared
- MSE
- MAE
- RMSE

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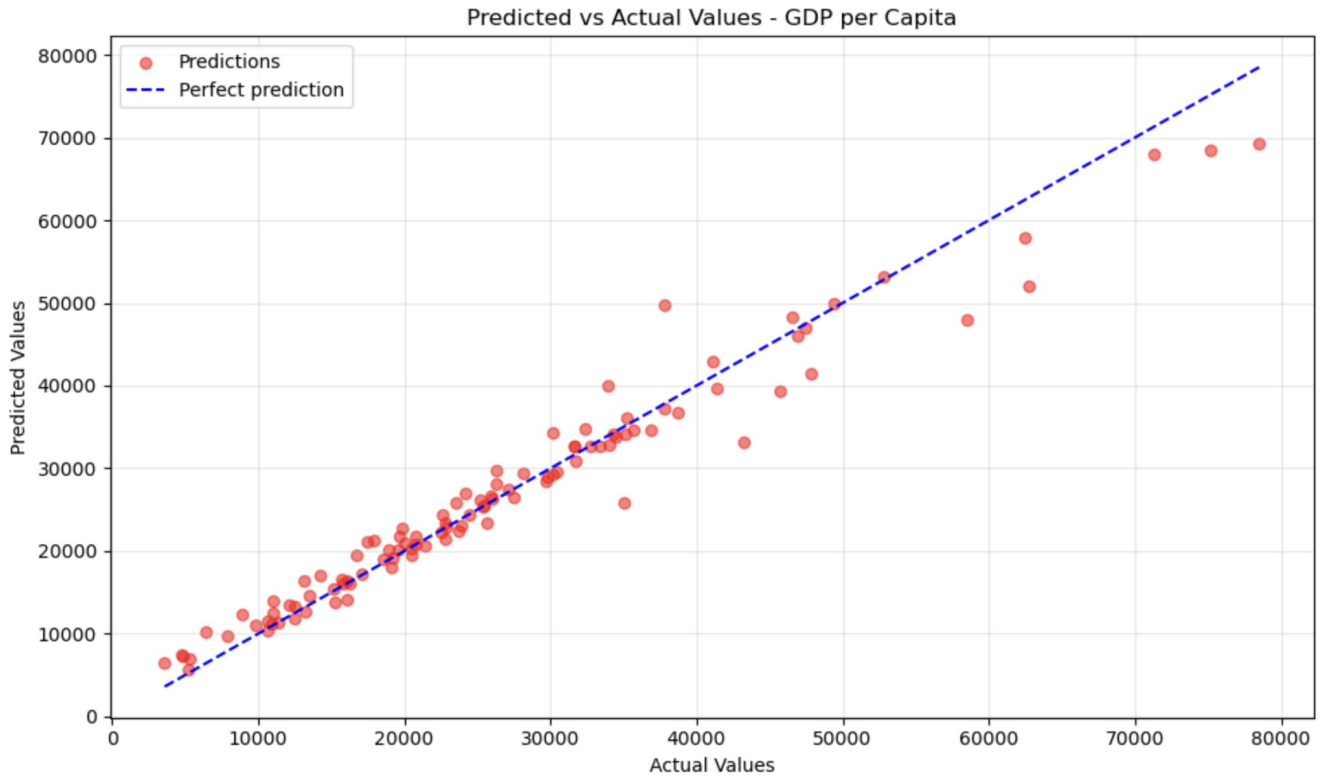
Can we predict GDP per capita and life expectancy based on import/export data?

Results for GDP per capita - RFR

Best parameters:
- max_depth: None
- max_features: None
- min_samples_leaf: 1
- min_samples_split: 2
- n_estimators: 100

Performance metrics:
- R-squared: 0.950
- MSE: 11393260.075
- MAE: 2130.359
- RMSE: 3375.390
- CV5 R-squared: 0.894

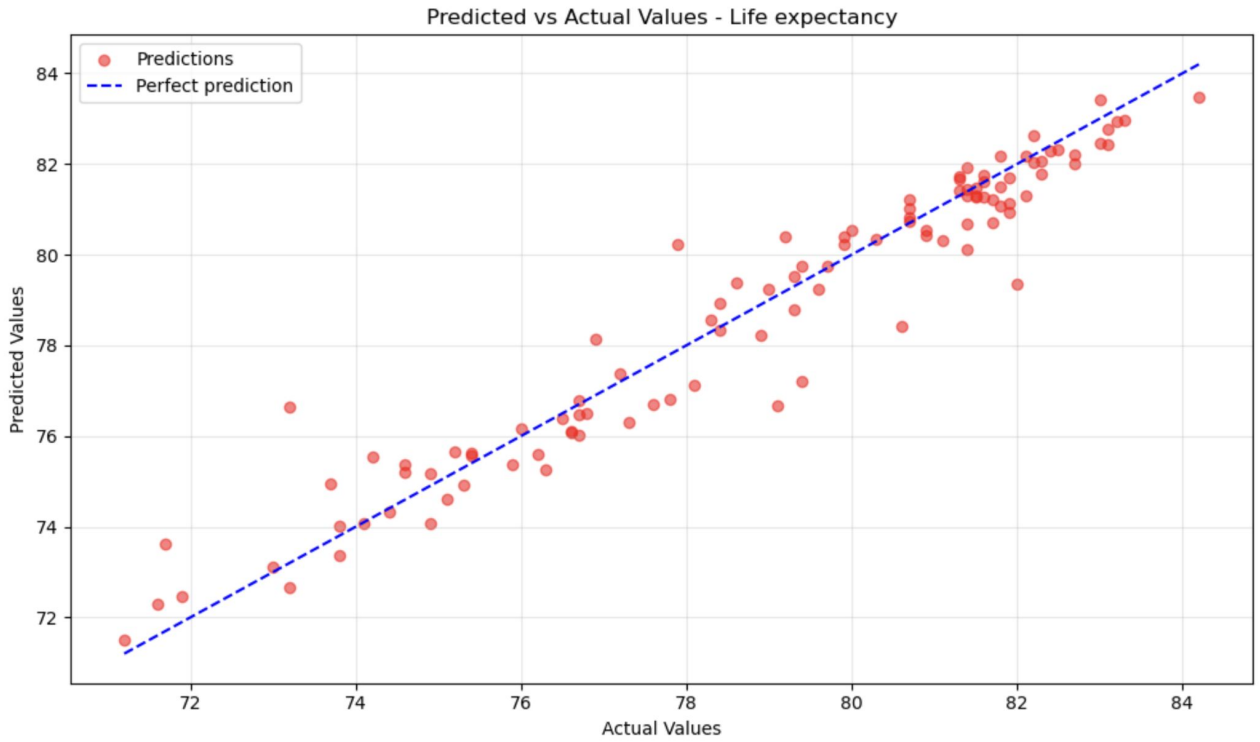


Can we predict GDP per capita and life expectancy based on import/export data?

Results for Life expectancy - GBR

Best parameters:
- learning_rate: 0.1
- max_depth: 3
- min_samples_leaf: 2
- min_samples_split: 5
- n_estimators: 200

Performance metrics:
- R-squared: 0.938
- MSE: 0.663
- MAE: 0.595
- RMSE: 0.814
- CV5 R-squared: 0.942



Conclusion

- Complex topic, food, health and economic factors are strongly interconnected
- Data collection can be challenging, especially in international projects
- Data can be inconsistent even from the same dataset
- Data exploration can take a long time and requires a lot of creativity and experience -> next time start early

Thank you for your attention! :)