

Software Development

Group 3 ETT



Outline

- Problem Description
- Implementation of the solution
- Quality of the solution
- Demo
- Evaluation of the development process

Problem Description

- Estimate the travel time (ETT) of a vessel
- Make use of historical data
- Break down a complex problem into smaller local ones
- Two routes: - Rotterdam - Hamburg
- Kiel - Gdynia



Implementation

Setting up the Development Infrastructure

- Create Development Infrastructure in Gitlab
- Implement CI/CD pipeline

Data Cleaning and Method Selection

- Clean Data using Weka and Jupyter notebooks
- Testing and selecting most reasonable features
- Testing several algorithms in Weka (linear regression, nearest neighbour, decision trees, ANN)

ML method	Correlation Coefficient	Root relative squared error
Linear Regression	0.4953	86.874 %
Nearest Neighbour	0.9378	35.0515 %
Decision Trees	0.989	14.8218 %
ANN	0.7995	61.4141 %

Implementation

Docker

- To enable platform independent deployment
- Make use of community-made images to increase development speed.



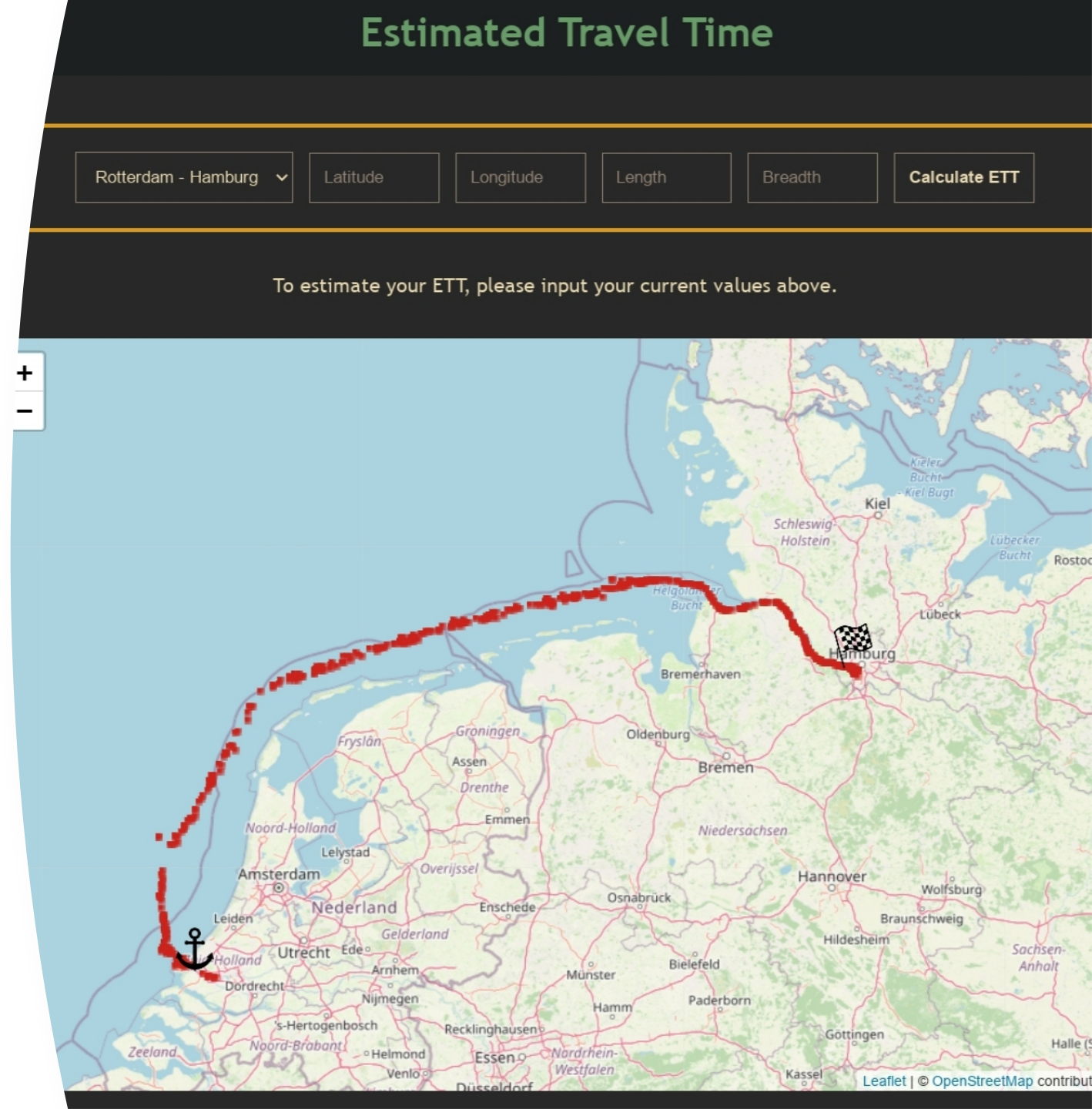
Implementation

Frontend

- Website with OSM Integration
- Unique random historical data Points for Visualization of Route

Backend

- Python/Flask Server
- Path Parameters to ensure data integrity
- Trained decision tree models saved to Pickle files to ensure a quick response



Implementation

Predictor Agent

- Split the routes into two parts
- Implement agent for each part
- Broker combines the results of the agents

Missing

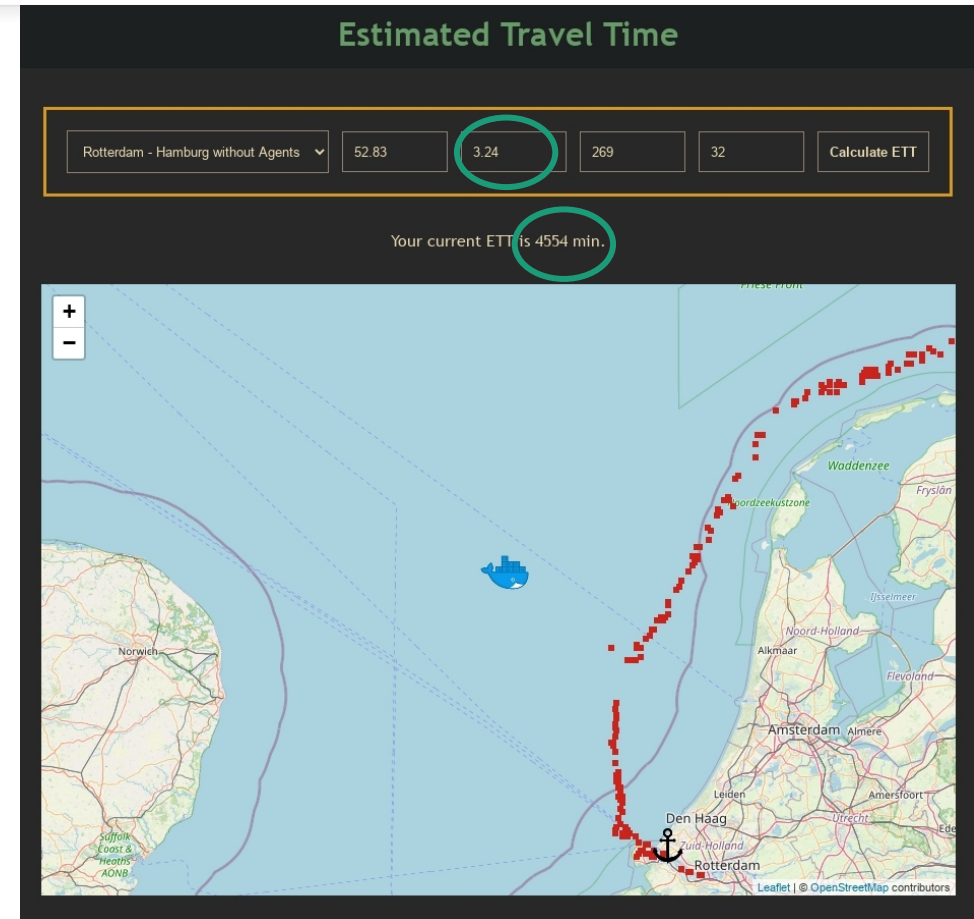
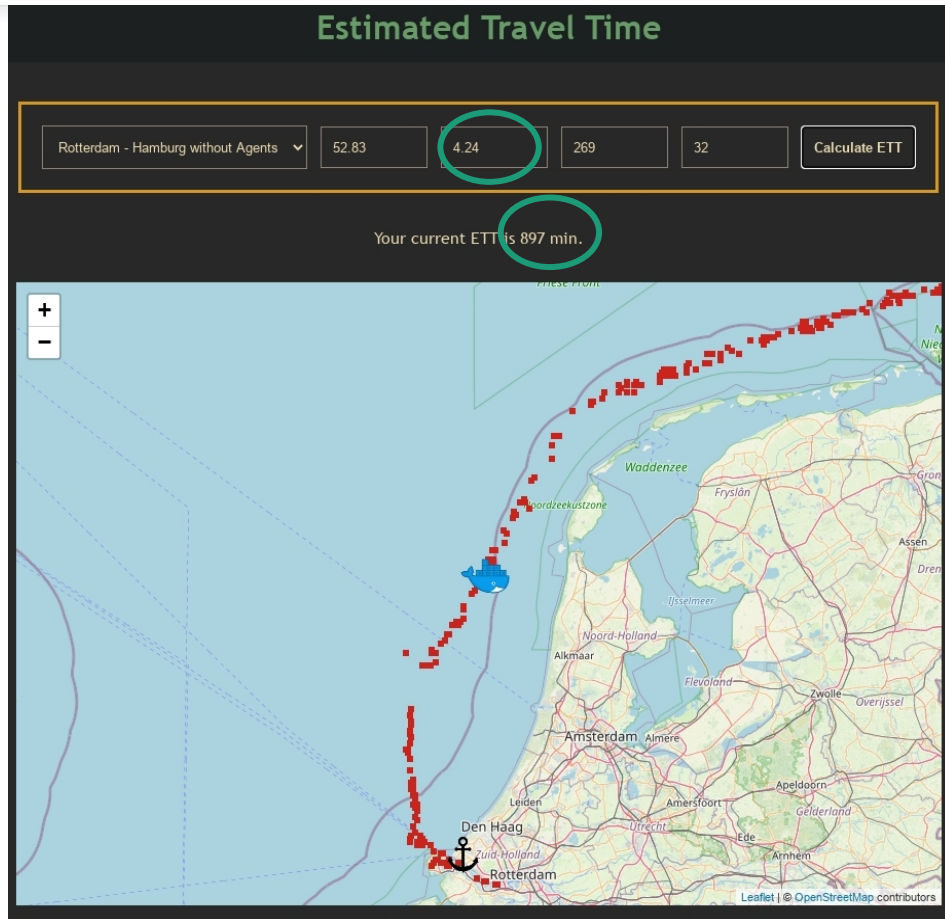
- Using ML in order to predict the input of agent 2



Demo



Quality of Solution



Quality of Solution

	Agents	No Agents	Actual Travel Time	Accuracy with Agents	Accuracy without Agents
Kiel-Gdynia	1543 min	1744 min	1739 min	0.957 (Agent 1) 0.871 (Agent 2)	0.723
Rotterdam-Hamburg	1204 min	897 min	898 min	0.874 (Agent 1) 0.774 (Agent 2)	0.604

Conclusion

- Model is adjusted to the routes -> Deviations lead to bad results
- Model works more accurately without agents

Evaluation of the development process SCRUM

Good

- Team work
- Team members supported each other
- Communication
- Sprint plans were detailed and helped to work efficiently
- Dailies

Fair

- Assigning Tasks, got better with time
- Punctuality

Sources

- The Photo on the first slide by an unknown author is licensed under CC BY-SA.
- Colorscheme gruvbox by morhetz “<https://github.com/morhetz/gruvbox>” licensed under MIT.