



A personalized framework for fuel efficient route planning

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Ph.D. Candidate/ Researcher

Together with:

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The ECO-DRIVE project

➤ 4 Project partners:

- Department of Transportation Planning and Engineering (NTUA), Department of Topography – Laboratory of General Geodesy (NTUA), Oseven Telematics, Nea Odos

➤ Duration of the project:

- 36 months (June 2020 – June 2023)

➤ Framework Program:

- ΕΣΠΑ 2014-2020 - Partnership Agreement on the Development Framework



EcoDrive



ανάπτυξη - εργασία - αλληλεγγύη



ΕΥΡΩΠΑΪΚΗ ΕΝΩΣΗ
ΕΥΡΩΠΑΪΚΟ ΤΑΜΕΙΟ
ΠΕΡΙΦΕΡΕΙΑΚΗΣ ΑΝΑΠΤΥΞΗΣ

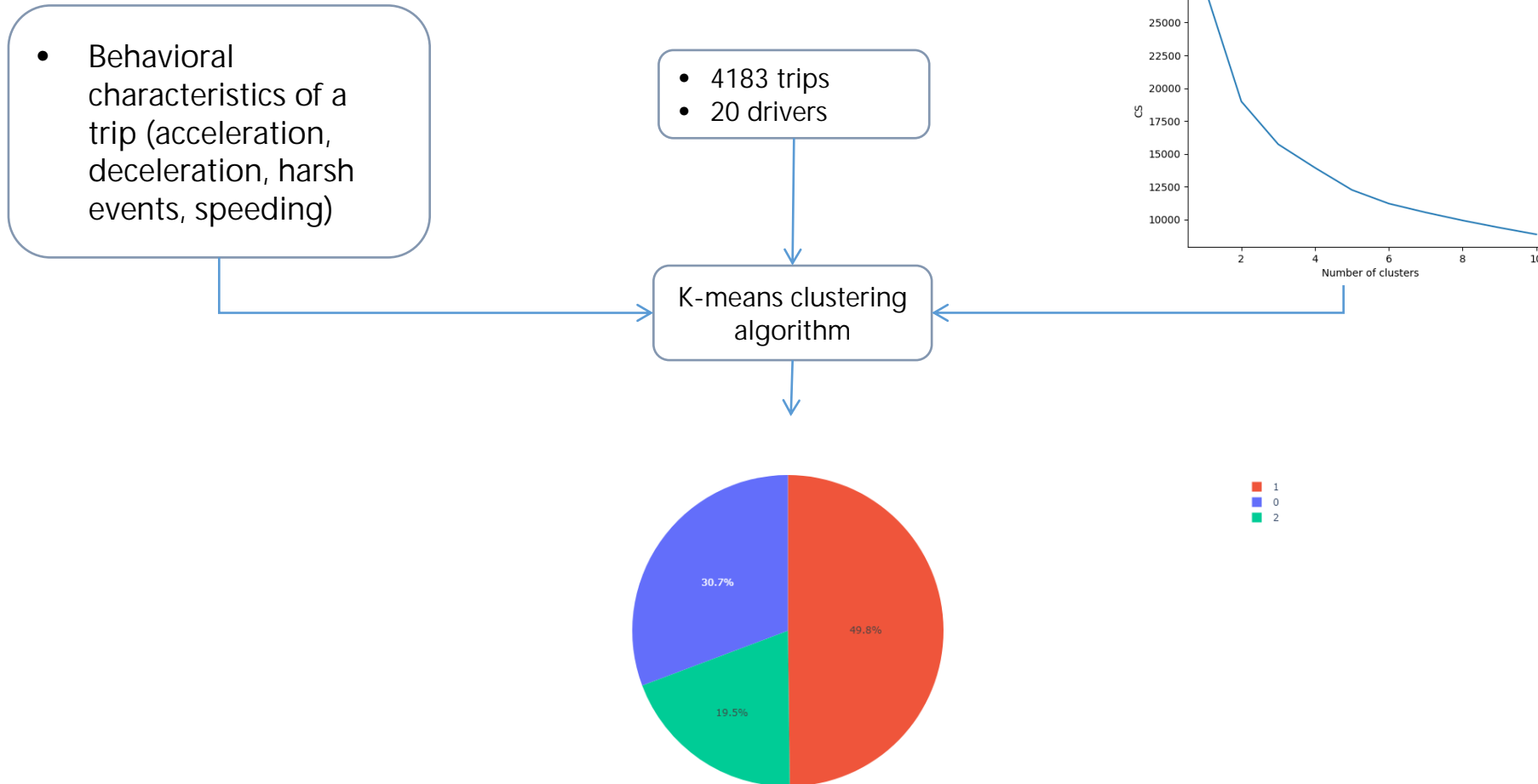
Background

Development of a personalized framework for **Fuel Efficient Route Planning** :

- Computation and mathematical attribution of **behavioral driving profiles**
- Development of a **fuel consumption forecasting model** including the driving profile of each user
- Given an Origin-Destination pair from the user and utilizing the fuel consumption model and external APIs, **a personalized eco-routing information system** is provided to the user



Computation and mathematical attribution of behavioral driving profiles

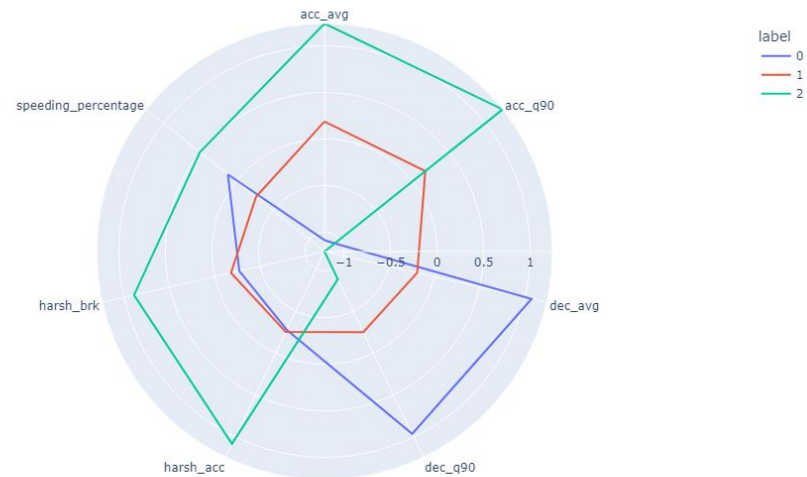


Computation and mathematical attribution of behavioral driving profiles

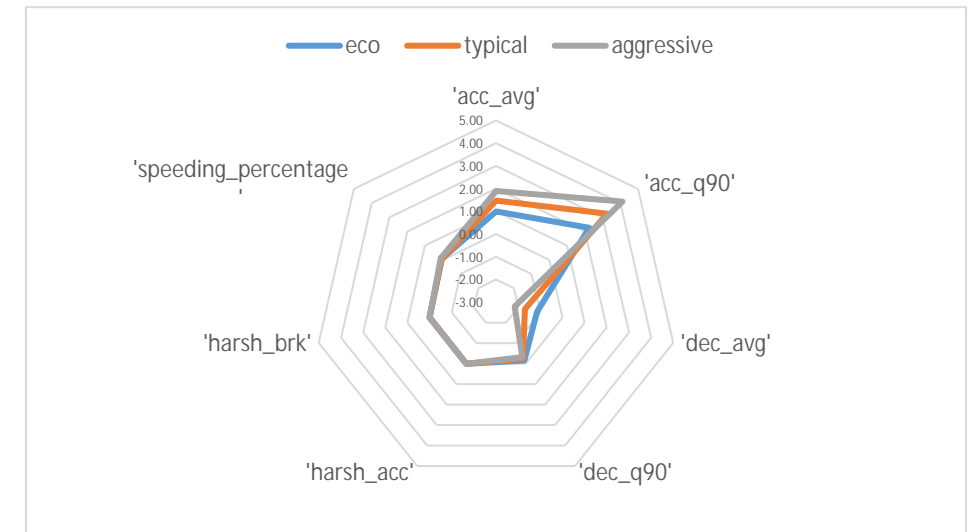
Clusters centroids

	'acc_avg'	'acc_q90'	'dec_avg'	'dec_q90'	'harsh_acc'	'harsh_brk'	'speeding_percentage'
Cluster 0	0,99	2,26	-1,14	-0,14	0,0004	0,0007	0,07
Cluster 1	1,46	3,20	-1,65	-0,25	0,0005	0,0008	0,036
Cluster2	1,84	4,00	-2,06	-0,30	0,003	0,003	0,10

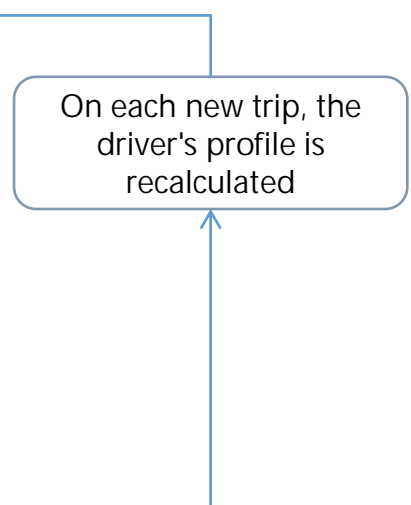
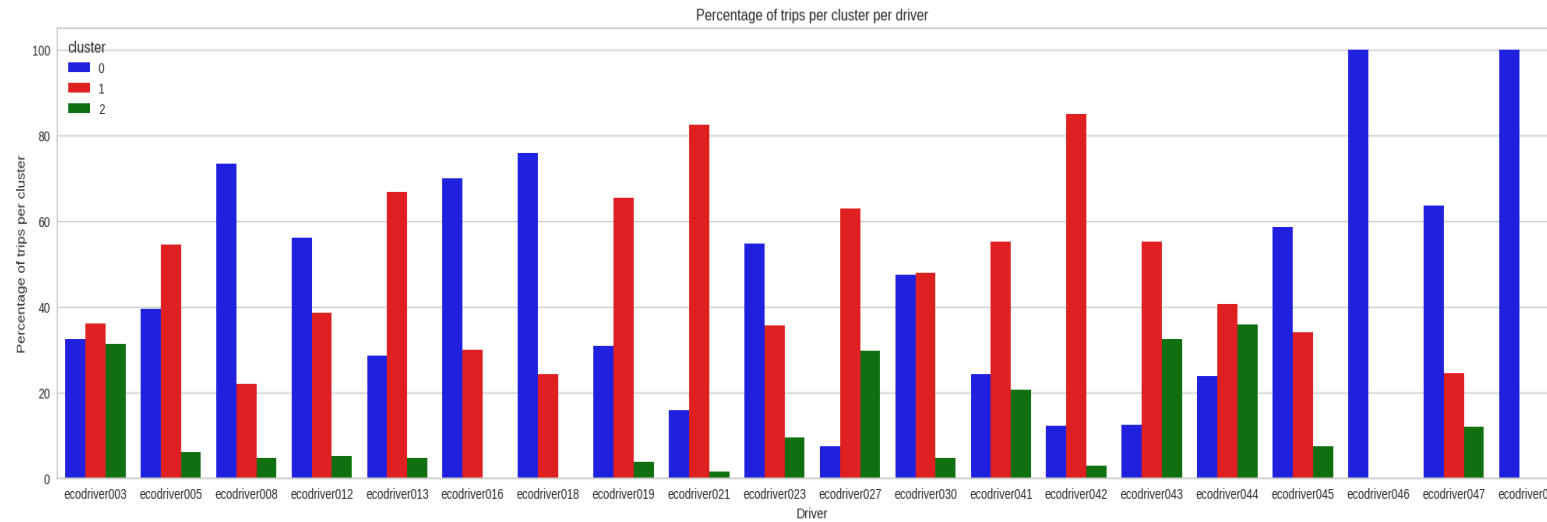
Normalized values of clusters centroids



Labeling the clusters



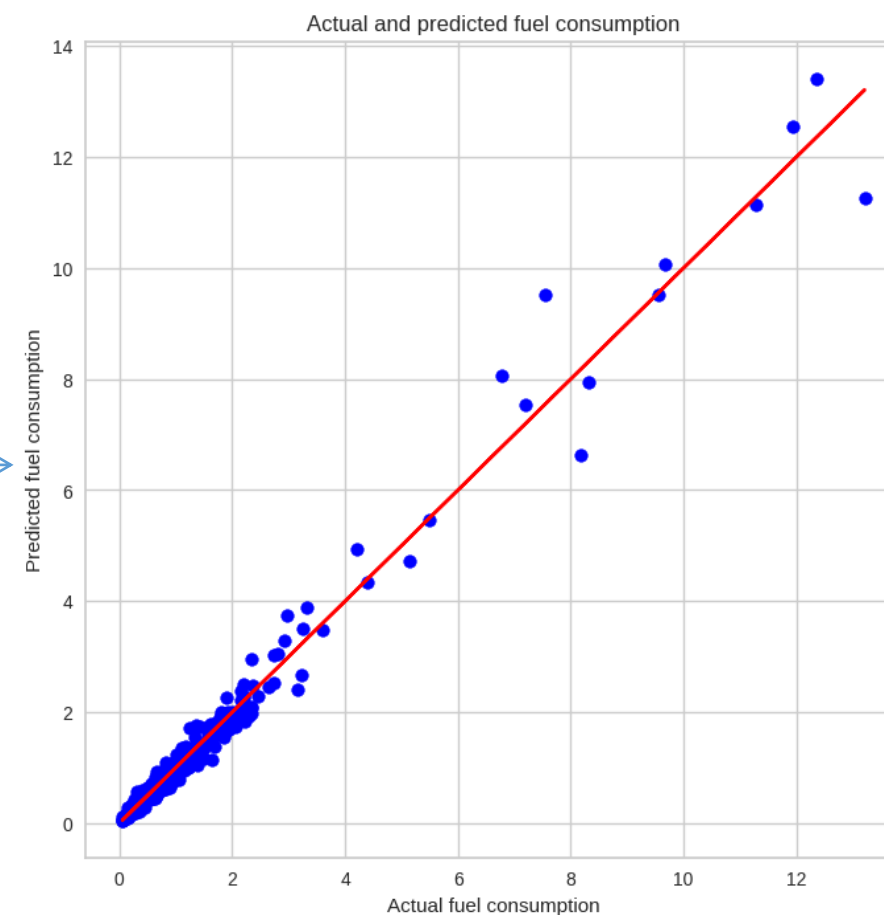
Computation and mathematical attribution of behavioral driving profiles



Development of a fuel consumption forecasting model

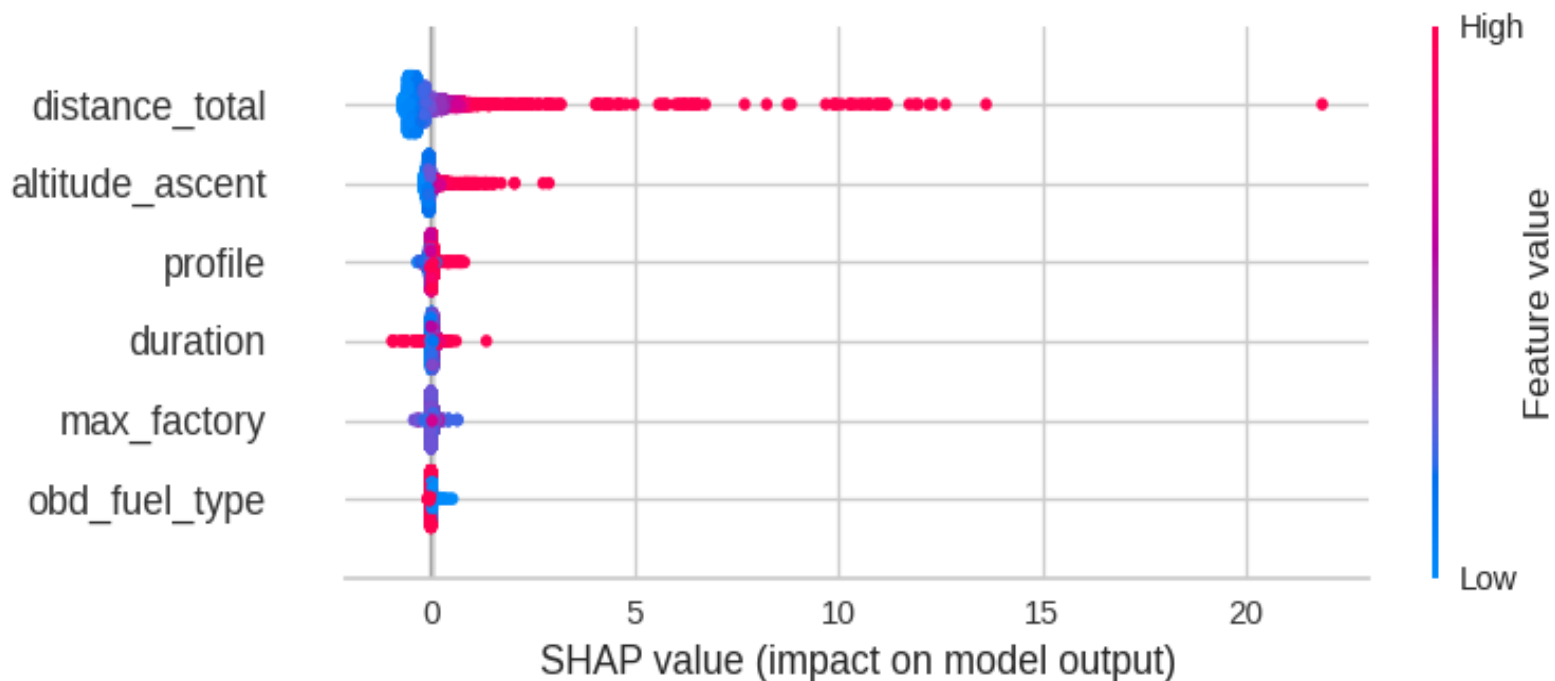
Variable name	Description	Unit
obd_fuel_type	Type of fuel consumed by the vehicle (petrol or diesel)	-
altitude_ascent	Sum of positive differences in altitude between consecutive points	m
distance_total	Total travel distance	Km
duration	Total trip duration	s
max_factory	Maximum average fuel consumption based on factory specifications	L/100km
profile	Driver Behaviour Index	-

R2 score = 0.98
Mean absolute percentage error = 10.47%
Total trips=3787
Train-Test set= 80-20%
Model= Gradient Boosting Decision Trees

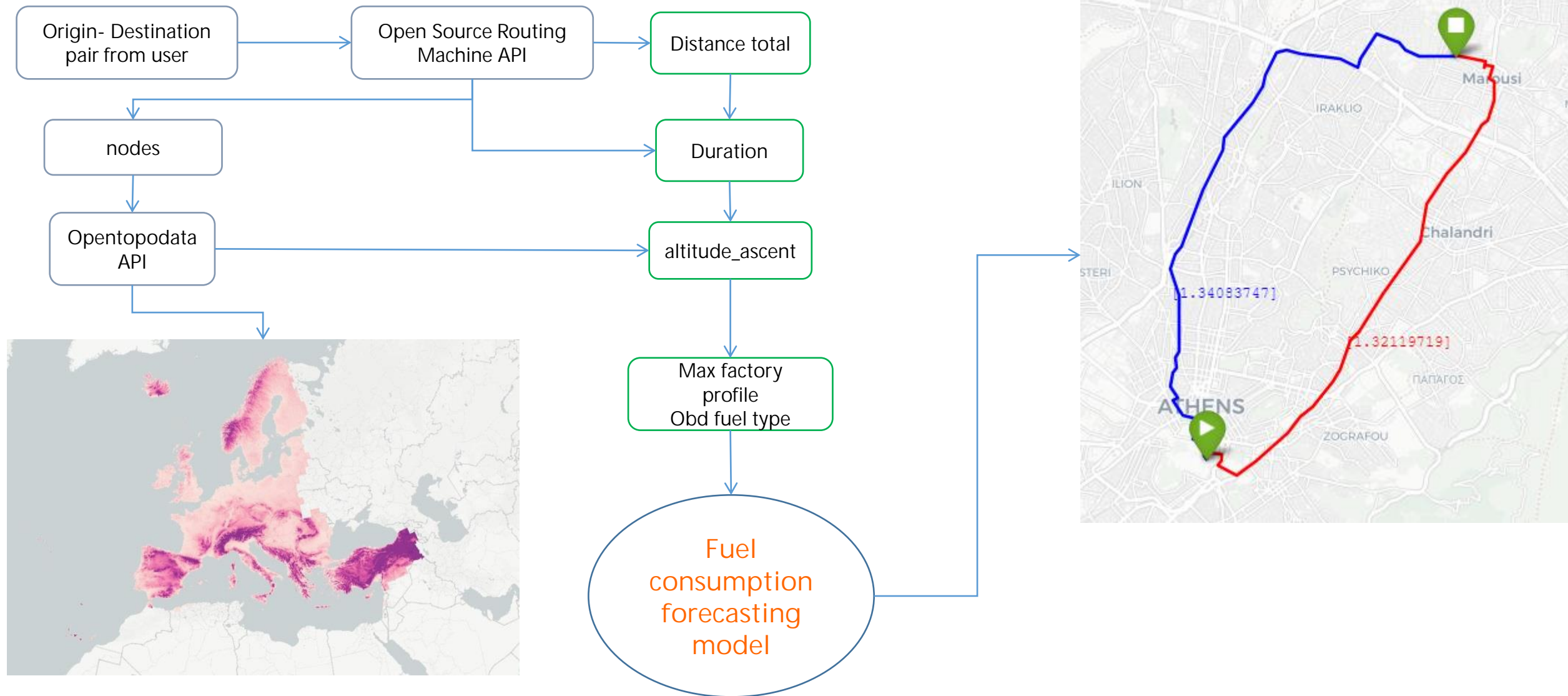


Development of a fuel consumption forecasting model

Explanation of input variables using the SHAP values



Development of a personalized eco-routing information system



Conclusions and Future Research

- The proposed methodology achieves to propose an optimal eco-route with high accuracy, based on the origin-destination pair given by the user
- The proposed methodology includes the information of the driving behavioral profile of each user to propose a personalized eco-route information
- Future Research will be focused on providing an optimal eco-routing information system to a fleet of vehicles





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