

# MASTER

Multiple ASpects TrajEctoRy  
management and analysis

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# Editorial

Welcome to the 9th issue of the MASTER newsletter!

As our project is going to the end, we are now running several secondments to finalise the research activities. We executed 14 secondments from CNR, UPRC, UNIVE, UVSQ and HUA towards our international and non academic partners. Most of these secondments are related to the future challenges of multiple aspects trajectories. It is very interesting to see how many new and interdisciplinary ideas came out from our secondments. Below you can read about our recent secondments and the experience of our secondees.

We also are finalising the preparation the MASTER final workshop that will be held in Hamburg, joint with the prestigious SIGSPATIAL 2023 conference.

See you there!

*Chiara Renso, MASTER Project Coordinator*

You can download this and previous issues of the newsletter from the MASTER web site:

<http://www.master-project-h2020.eu>

# Secondments

## Experiences and results

**During the period June 2023 to October 2023** we had a consistent number of secondments!

All secondments were associated with the WP5 applications scenarios and WP4, Task 4.5 about future challenges. It has been very stimulating to see how researchers investigated very novel techniques to cope with multiple aspects trajectories from different perspectives.

### FROM UPRC

Nikolaos Koutroumanis and Yannis Poulakis have been seconded to Dalhousie University. They collaborated with DAI staff in automated machine learning methods for clustering algorithms. Several challenges have been identified and tackled, such as the selection of validity indices suitable for evaluation of the clustering algorithms and the selection of optimization algorithms to tune select the machine learning pipeline.

### FROM CNR

Emanuele Carlini, Hanna Kavalionak, Raffaele Perego and Chiara Renso seconded to Dalhousie University have performed activities on the analysis of vessel trajectories, in developing a “port graphs” from 3 years of vessels AIS data, in which ports are nodes and edges come from vessels trajectories between ports. from this, they studied the timeseries of graphs using complex network techniques to find relevant measurements and features. They also discussed a method to predict the vessels trajectories for long term destination prediction (for periods longer than 8 hours). The method uses the spatial exagonal cells and the lat-long coordinates and the direction to build a Machine Learning model to predict the destination of a

vessel based on historical data. Preliminary experiments show this method performs better than baselines.

### FROM UVSQ

Saloua Bouabba and Karine Zeitouni have been seconded to Universidade Federal Do Ceara focussed on a decentralized approach for training a GAN to generate synthetic trajectories and specifically on Federated learning, a privacy-preserving machine learning paradigm where participants build a model without revealing their data, minimizing individual mobility data leakage risks.

were examined to forecast a proper partitioning scheme for trajectory data. This partitioned data could then be used by the NoSQL databases to run the queries.

### FROM UNIVE

Alessandra Raffaeta, Alessandro Biccato, and Diletta Olliaro have spent their secondment period to PUC.

The focus of Alessandra was more on how the use of ChatGPT and LangChain can simplify the development of Natural Language Interfaces for databases (NLIDBs). Furthermore Alessandro, Diletta and Alessandra focused on prediction of the fishing effort for the fishing vessels in the Northern and Central Adriatic Sea. They are experimenting with several techniques to improve the prediction of the fishing effort, which is an essential indicator for monitoring the fishing pressure on an area over time. They have already developed an approach which uses Random Forest boosted with the insertion of specific spatial and temporal features exploiting the correlations inside the data.



Alberto Veneri and Francesco Brusolin went to secondment to Dalhousie University

During their secondment, they performed new experiments using eXplainable Artificial Intelligence (XAI)

techniques starting from previous work on the analysis of vessel trajectories to predict the fishing effort in the Adriatic Sea. In particular, they focused on applying intrinsically interpretable methods, such as Explainable Boosting Machine, and well-known explanation methods, such as SHAP and LIME, to explain the prediction of the fishing effort.

### FROM HUA

Ioannis Kontopoulos, Theodoros Theodoropoulos, and Ioannis Korontanis, spent their secondment to Dalhousie University to investigate novel unsupervised techniques for trajectory clustering and in particular Reinforcement Learning.

They also examined novel adaptive partitioning techniques for trajectories to improve the response time of NoSQL databases: Graph Neural Networks (GNNs)



SECONDMENT EXPERIENCES



MASTER



# UPCOMING EVENT

## EMODE23

**1st ACM SIGSPATIAL International Workshop  
on Methods for Enriched Mobility Data**

**NOVEMBER 13, 2023  
HAMBURG, GERMANY**

The project is going to an end and it's time to hold our final workshop.

Final MASTER workshop is called EMODE23: 1st ACM SIGSPATIAL International Workshop on Methods for Enriched Mobility Data: Emerging issues and Ethical perspectives 2023 (<http://www.master-project-h2020.eu/emode23/>).

The workshop is planned to be held as half day on November 13, 2023 in Hamburg, Germany in conjunction with the **SIGSPATIAL** conference (<https://sigspatial2023.sigspatial.org/>). The workshop received 10 submissions in a wide range of topics all around the current and future challenges of enriched mobility data.



# EMODE23


**1st ACM SIGSPATIAL International Workshop on Methods for Enriched Mobility Data:  
Emerging issues and Ethical perspectives 2023 (EMODE23)**

**November 13, 2023**

**Hamburg, Germany**

 Submission deadline: **September 1, 2023**

 Authors notification: September 29, 2023

 Camera-ready due: October 13, 2023

 Workshop day: November 13, 2023

Joint with **ACM SIGSPATIAL 2023**, *International Conference on Advances in Geographic Information Systems*

**THE MASTER H2020 PROJECT:  
EVENTS, EXPERIENCES AND MUCH MORE! HAVE A LOOK AT THE WEBSITE**  
to read the story of the project in the words of those who experienced it.

**MASTER**

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**MASTER**



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News



**Secondment of HUA staff to UFSC**

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December 13, 2023



**EMODE – Final MASTER workshop**

[Read More](#)

November 20, 2023



**Secondment of UNIVE researchers to Dalhousie University**

[Read More](#)

September 29, 2023



**Secondment of UVSQ to Federal University of Ceara'**

[Read More](#)

September 29, 2023

**MASTER**



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### Editorial Secretariat

master-info@isti.cnr.it

### Editorial Board

Chiara Renso  
Beatrice Rapisarda  
Cristina Muntean

### Layout and Design

Beatrice Rapisarda

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Coordinator of the project: Chiara Renso | chiara.renso@isti.cnr.it

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