

PhD Position in CENIT Group (VAC-2021-36)

Title of the PhD project: Origen-destination matrices estimation for simulating demand regional models

INTRODUCTION:

The International Centre for Numerical Methods in Engineering (CIMNE, www.cimne.com) is a research centre, created in 1987 by consortium between the Catalan Government and the Universitat Politècnica de Catalunya (UPC-BarcelonaTech), devoted to the development and application of numerical methods to a wide range of areas in engineering. CIMNE has been selected as a Severo Ochoa Centre of Excellence for the period 2019-2023, the highest level of recognition of excellence and leadership awarded to a research centre in Spain.

POSITION DETAILS

Number of vacancies: 1

Category: PhD (PHD2)

Location: Barcelona

Yearly salary (gross): 17.563,14 EUR

Working hours: Full time

Duration: 3 years

Starting date: No later than Sept 2021

FUNCTIONS TO BE DEVELOPED BY THE APPLICANT

CIMNE is looking for a **PhD Researcher** to be part of the Research and Technical Development (RTD) Group CENIT.

The functions assigned to the candidate will be:

- Complete a PhD on Civil Engineering at Universitat Politècnica de Catalunya – Barcelona Tech. The candidate is expected to complete the PhD thesis in a maximum of three years.
- Collaborate with various research groups within CIMNE and worldwide.
- To publish a minimum of two papers in JCR journals during the PhD period, author and co-author articles in high-impact international journals.
- Carry out quality research, training and management.
- Participate on the dissemination and outreach activities associated with the project.
- Participate in international conferences presenting her/his work.

DESCRIPTION OF THE PDH PROJECT:

Despite being a widely studied topic, the estimation of origin-destination matrices is still a source of concern for transport administrations looking for the most optimal way to estimate them, since it is the main variable in traffic simulation. Currently, despite the popularization of activity-based models and, more recently, agentive-based models, most administrations base their regional transportation models on the 4-stage model. This limits the ability to simulate the mobility of the territory, where the mobility required for work purposes is increasingly less marked and daily mobility for recreational reasons is gaining a significant amount, generating trips throughout the day outside the typical peak hours. Although the 4-stage models are based on the peak hour matrix (static model), which is a robust indicator of mobility, the estimation of hourly O-D matrices is a tool of interest for administrations since it not only enriches the model but also allows studying flows at a higher level of detail and the effects of certain transport policies on mobility over time.

The typical approach to the problem is through bi-level optimization (minimizing the distance between counts and traffic assignments). From here, one can opt for quasi-dynamic simulation that brings transport models closer to the advantages provided by activity and agent-based models. In practice, the main source of information are still mobility surveys combined with traffic data or license plate recognition cameras, which are a source of continuous information over time from which to derive the hourly matrices.

The result of the work would allow public administrations to have more accurate origin-destination models with which to improve mobility forecasts.

References

ARINBO- Nuevo sistema de gestión de gestión de movilidad urbana basado en matriz origen-destino y en herramientas de analítica avanzada. Nuclis Research Project with ALTRAN, CENIT-CIMNE and EURECAT. 2020-2021

Puignau Arrigain S.A., Pons-Prats J., Saurí Marchán S. (2020) New Data and Methods for Modelling Future Urban Travel Demand: A State of the Art Review. In: Diez P., Neittaanmäki P., Periaux J., Tuovinen T., Pons-Prats J. (eds) Computation and Big Data for Transport. Computational Methods in Applied Sciences, vol 54. Springer, Cham. Print ISBN 978-3-030-37751-9.

Motohiro Fujita, Shinji Yamada, Shintaro Murakami (2017) "Time Coefficient Estimation for Hourly Origin-Destination Demand from Observed Link Flow Based on Semidynamic Traffic Assignment", Journal of Advanced Transportation, vol. 2017, Article ID 6495861, 14 pages, <https://doi.org/10.1155/2017/6495861>

REQUIREMENTS

1. Master in Science in Operational Research, Mathematics or Transportation Engineering.
2. A good command of English
3. An enthusiastic attitude to conduct research, being hard-worker and critic

EVALUATION OF CANDIDATES

The requirements and merits will be evaluated with a maximum mark of 100 points. Such maximum mark will be obtained by adding up the points obtained in the following items:

- Academic record (60%)
- Previous research and academic experience in the field of the position (20%)
- Programming skills (10%)
- Language skills (10%)

HOW TO APPLY

Candidates must complete the "Application Form" form on our website, indicating the reference of the vacancy and attaching the following documents **in English**:

- Curriculum vitae
- A motivation letter
- Academic transcripts from all Undergraduate and MSc degrees
- Name and institutional contact information of two possible referees

The deadline for registration to the offer ends on 31st May, 2021 at 12 noon.

The shortlisted candidates may be called for an interview. They may also be required to provide further supporting documentation.

CIMNE is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, colour, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law. CIMNE has been awarded the HRS4R label.