

Smartifying Logistics with Computational Intelligence

Jhonny Vladimir Pincay Nieves

Mobility is crucial in the functioning of a city. Improving it is complex since it influences multiple city's aspects. Nonetheless, any enhancement in mobility means that a wide range of citizens and economic sectors can profit from the potential benefits.

This work attempts to improve or *smartify* the service area of mobility, specifically, the last-mile delivery. To that end, a framework for improving the first-try success in the last-mile delivery is defined. In conceptualizing the framework, three artifacts were developed with a design science methodology and a transdisciplinary approach: an analysis tool for traffic areas addressing the uncertainty and incompleteness of geospatial data, a linguistic traffic summarizer, and a customer classifier that does not compromise their privacy. The author collaborated with two companies to design, implement, and evaluate the artifacts: *Swiss Post* and *Viasuisse AG*. The transdisciplinary collaboration enabled the artifacts to be developed incorporating the practical know-how of industrial practitioners while extending the scientific knowledge.

This Ph.D. thesis is split into five parts: The first part presents the motivation and objectives. The second part explores the theories in which this endeavor is grounded. Then, the third part is about building artifacts to address problems of traffic data analysis and ethical classification of postal customers. The fourth part introduces a conceptual framework built upon the outcome of the developed applications; an instantiation to evaluate the framework is also completed. The outcome, limitations, and conclusions are presented in the fifth part.

The outcome of this Ph.D. thesis demonstrates how complex processes and improvements can be performed using approximate methods that do not require large amounts of precise information while still achieving good results.

Jury:

Prof. Dr. Edy Portmann (thesis supervisor)

Prof. Dr. Miroslav Hudec (external co-examiner)

P.D. Dr. Luis Terán (internal co-examiner)

Prof. Dr. Rolf Ingold (president of the jury)