PhD SCHOLARSHIP APPLICATION DATA

Business Division Business Area	Industry and Transport Smart Systems
Scholarship location Province/Building	Donostia-San Sebastián Gipuzkoa/M7

SCHOLARSHIP DESCRIPTION

Title: The advanced diagnosis and impact model of data analysis in the digital industry Brief description of scholarship:

The aim of this scholarship is to tackle the paradigm of Industry 4.0 from the data science viewpoint, effectively applying the latest technological advances in data analysis to the digital industry. Different industrial asset manufacturing and operating sectors that generate vast quantities of processing and operating data will be analysed in order to optimise production (rationalising the use of resources, reducing defects and nonconformities, increasing availability), extract useful knowledge of involved processes and assets and support business decision making. The technology to be investigated and applied shall focus on Machine Learning and Big Data analytics paradigms and on designing analysis, diagnosis and impact methodology.

Scholarship description:

Industrial processes, whether extractive, manufacturing or transformation, are complex and imply a large number of subprocesses and parameters that should be monitored in order to control the production process. Advanced monitoring that contributes to increasing the level of understanding and improvement of these processes thanks to the methodology to be developed, which involves acquisition, storage, analysis and inspection tasks to provide advanced solutions to complex problems from the data science viewpoint. The amount of registered data is ever increasing and they are stored in increasingly larger databases, of which information is not being used adequately. Current information analysis and management technologies allow to respond to the following needs: IoT, Big Data, Machine Learning, etc.

The analysis, diagnosis, and impact (ADI) model to be developed is the technological solution that aims to respond to the new needs and opportunities that the digital industry poses, via smart analysis of the monitored data from involved processes and assets. The challenge lies in knowing what to do with the available information in order to obtain a useful competitive advantage. The methodology to be designed will allow to infer and shape the implicit knowledge in the data, obtaining descriptive, predictive, and prescriptive models based on data that are able to solve complex problems to be addressed in the scholarship. Of the techniques to research and develop

in the ADI context, special emphasis will be placed on hybrid or semi-physical multivariable models for implementing soft or virtual sensors and on deep learning algorithms to shape spatial-temporal events in time series, as well as on the concept drift paradigm to design optimal upgrade strategies and use the generated models.

The PhD student will collaborate with other members of the Business Department and other areas of the Division to work on the following areas of applied research:

1. Defining and designing ADI analysis methodology from the data science viewpoint and driven by real problems posed by the digital industry.

2. Implementing the necessary algorithms to automate the learning process of models that allow to solve complex industrial problems via analysis of the available information, with special emphasis on hybrid or semi-physical multivariable models and deep learning algorithms to shape spatial-temporal events in time series.

3. Designing optimal solutions and strategies to implement soft or virtual sensors and to upgrade and use the models generated from the concept drift paradigm.

4. Deploying the developed methodology and algorithms in industrial processes and assets that involve mass analysis of monitored data, using Big Data strategies to do so.

5. Validating results in real application settings via online analysis of monitored data, quantifying the improvement level of the process regarding the proposed objectives, such as production optimisation and energy consumption, minimising defective products and predicting events of interest in involved processes and assets.

Requirements:

The PhD candidate shall meet the following requirements:

- Degree and Specialisation: Degree in Mathematics, Physics, Industrial Engineering, IT, Telecommunications or equivalent.

- Languages: Knowledge of English (written and spoken).

- IT skills: Somebody who enjoys and understands programming techniques and languages, familiarised with use of Python, R, Matlab or similar, Linux and LaTeX.

- The following will be a plus: experience in data analytics, knowledge of statistics and a general interest in new advanced information management and artificial intelligence technologies.

Further information and applications: http://bit.ly/2qA5LI4