PhD SCHOLARSHIP APPLICATION

Division / Business Area: ICT / OPTIMA
Building / Province: Derio 700 / Bizkaia

SCHOLARSHIP DESCRIPTION

Title: Deep Learning Models for High Dimensionality Big Data Problems.

Brief description: The aim of the scholarship is to deepen knowledge of data analytic and optimisation techniques to capture and exploit new data based knowledge. The thesis will essentially focus on the development of new pattern detection techniques based on Deep Learning neuronal computing for temporary series of data, as well as its application in different and extremely diverse case studies in various domains, such as Mobility, Virtual Reality or Cyber-security.

Detailed description: The doctoral scholarship falls within the framework of Big Data and aims to advance on existing knowledge regarding Deep Learning neuronal computing, with approximations that are capable of remembering knowledge learnt on data over time. These new forms of neuronal computing, called LSTM (Long Short Time Memory) networks, are capable of retaining and exploiting patterns learnt over time, whereby they are extremely efficient when it comes to processing data characterised by a high degree of temporary correlation (sequences).

This is the case of many practical scenarios emerging in fields such as Energy or Industry, where much of the data generated is in the form of temporary series (e.g. functioning data sensorised in a machine, energy consumption of a home or the information capture for the characterisation of a building with respect to its energy consumption). Through the use of the LSTM networks, it is possible, for example, to predict when a machine will fail with greater precision and accuracy than other predictive models. Furthermore, the uses of this type of models go beyond the aforementioned domains, whereby they can be used, for example, for the recognition and detection of objects in images and videos, the generation of images/sound based on text, the analysis of connectomic prints of the human brain, the characterisation of client portfolios for loyalty or the creation of intelligence in video games, among many others.

In particular, the PhD candidate will collaborate with other team members in the following lines:

- Automatic construction of deep neural models using bio-inspired optimisation algorithms for optimal design of hybrid layers which conform them.

- Design of deep neural computing models with incremental learning and diversity mechanisms for learning problems with demanding requirements in terms of computing times (e.g.: detection of data flow anomalies).

- Inclusion of temporary space variables in LTSM neuronal computing models for the analysis of mobility, in which the model may learn from data that is correlated in time and in space.

- Application of the knowledge generated with data from different domains, highlighting Mobility (route prediction, space-time analysis of mobility layouts based on heterogeneous information, e.g. mobile telephony CDR, floating car data, inductive loop readings), Virtual Reality (FOV prediction for proactive rendering, visual identification) or Cyber-security (detection of intrusion, neuronal deciphering).

In any case, the candidate shall be given sufficient flexibility to define research lines of his/her own interest which are in line with the thesis topic (deep learning).

REQUIREMENTS

Degree and specialisation:	Computer Engineering (Computer Science and Artificial Intelligence Science); Telecommunication Engineering; Mathematics; Physics.
Languages:	Intermediate-advanced level of English Very advanced level of Spanish.
IT skills:	Python, R, MATLAB, Latex
The following will be a plus:	The following will be a plus: candidates with previous training in the thesis topics (at Master's or similar level), and in particular machine learning models and neural computing models. Proactivity, critical analysis skills and teamworking. Ability to generate result-oriented applied science.

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