

PhD SCHOLARSHIP APPLICATION FORM 2016

ORGANISATION Business Division Business Area	TECNALIA RESEARCH & INNOVATION ICT/European Software Institute OPTIMA (Optimisation, Modelling and Analytics)
Scholarship location Province/Building	BIZKAIA, Parque Tecnológico de Bizkaia. Edificio 700-Derio
Tutor	Dr Javier Del Ser Lorente

SCHOLARSHIP DESCRIPTION

Title: New Bio-inspired Techniques aimed at solving Data Optimisation and Analysis Problems and their implementation in Big Data Architecture

Brief Description of Scholarship:

The Big Data computing paradigm is today a reality. Analysing huge data volumes and making decisions based on such analysis are common to every company and business sector, not only in those which traditionally make intensive use of Information and Communication Technologies (ICTs), but also in other more industrial ones such as the manufacturing of goods and equipment, energy and sport sectors, among many others. In fact, multiple studies point to an exponential growth in the global need for Big Data, also resulting in demands for technological breakthrough and advanced data analysis, not to mention experts qualified in the field. In this context, the scholarship programme will focus on a detailed study of cutting-edge data optimisation and analysis techniques, with a design inspired in processes found in Nature such as: pheromone deposits by ants in their search for food; genetic heritage in evolution processes; musical composition in jazz bands; or birth, colonisation and death mechanisms in coral reefs. All the aforementioned natural phenomena have been imitated in different optimisation techniques, achieving better results than other conventional optimisation techniques. The scholarship will not only envisage derivation from new bio-inspired techniques, but also its application to extremely complex optimisation problems to supplement supervised learning in hybrid mode for clustering, classification and prediction. A special focus will be given to Telecommunications, Energy and Logistics application scenarios, as well as its conceptual implementation to new parallel computing models (SPARK, MAP/REDUCE, etc.):

Scholarship description:

The specific scholarship outcomes are as follows:

- Train the PhD student in Evolutionary Computing and Swarm Intelligence Algorithms as cutting-edge tools for efficient treatment and solving of highly complex optimisation problems.
- Analyse the state-of-the-art implementation of these techniques to practical Telecommunications and Energy problems and in particular to Smart Grids and Microgrids.
- Devise new bio-inspired algorithms either by increasing known techniques or radically innovating algorithm design, operating method and learning and/or potential implementation in distributed architectures.
- Comparing them with benchmark problems and applying them to actual known problems.
- Study their application as auxiliary processes in hybrid classification, clustering and predicting models (e.g. as selectors/builders of characteristics) and their potential implementation in Big Data architectures.
- Publish the results in international conferences and indexed journals of algorithmic scope.
- As the scholarship holder will be part of a research team with high research and publishing activity (bigdatabytecnalia.com), work methodology will be result-oriented and determined by publication opportunities which may arise throughout the scholarship term.

The scholarship will be undertaken at Communications Engineering Department of the University of the Basque Country (UPV/EHU) located in Bilbao, Bizkaia (Spain). The doctoral dissertation will be supervised by Dr. Javier Del Ser (head researcher at the OPTIMA area of TECNALIA) and by a lecturer from the same department, Prof. Dr. Miren Nekane Bilbao.

Requirements:

The PhD candidate shall meet the following requirements:

- Qualification and speciality: Degree in Computing Science Engineering, Telecommunications Engineering (Telematics/radio speciality), Mathematics, Physics.
- Languages: English is essential (high level writing; and high level speaking skills desirable). Knowledge of other languages will be highly valued.
- IT skills: specific-purpose scripting languages (Matlab, Python) Java, C/C++/C#. IT Office skills: Word, Power Point. Knowledge of Latex for scientific paper preparation is highly desirable.

- Proactivity, result-orientation, result analysis and presentation capacity, team-working capacity, previous master degrees (with access to PhD) will also be a plus.