

# PhD Studentship

## Smart Technology Research Centre / Computational Intelligence Research Group

### ***School of Design, Engineering and Computing, Bournemouth University, United Kingdom***

Applications are invited for a 3 year PhD research studentship to work on a project entitled "**Probabilistic modelling of customer behaviour using nature-inspired hybrid optimisation techniques**" funded by the Great Western Research (GWR) and British Telecommunications plc (BT). This is a collaborative project between Smart Technology Research Centre from Bournemouth University, Artificial Intelligence Research Group from Bristol University and BT Intelligent Systems Labs, one of the largest industrial R&D labs of this type in UK.

From the business perspective, one of the key capabilities assuring survival and prosperity of the company is the ability to predict and deliver the best interaction with respect to every single customer that makes up its business. Successful prediction and prevention of customer actions like churn, complaint, diminishing spend, repetitive fault or even fraudulent behaviour requires understanding of the complex, interrelated and evolving data that accompany these sudden turns or changes. Throughout their lifetime, customers interact with the service provider leaving temporal data sequences capturing discrete events, continuous service usage statistics and various static characteristics, measurements of which come at very different frequencies and are often distorted by a mixture of incomplete attributes of various types. Modelling such composite multivariate sequences requires non-standard approaches far beyond linear time series analysis or even static classification and regression techniques which are unable to properly handle the temporal nature of the evolving customer behaviour.

Given the statistical nature of the problem combined with the massive complexity and scale of the modelling environment, the project will investigate the use of generative composite probabilistic models based on Gaussian processes coupled with nature-inspired optimisation engine to comprehensively model and predict customer behaviour up to any given time into the future. Such a stochastic simulatory approach will be applied to large corporate datasets with multi-type data in order to deliver soft predictions in a form of temporal likelihoods or probability distributions. Flexible and highly explorative optimisation mechanisms common to nature-inspired particle-based methods like particle filters, simulated annealing, stochastic diffusion search, particle swarm optimisation will be explored in order to include many more conditioning attributes into the feature space potentially leading to more precise predictions. All the devised models will be evaluated via a live operation trial at the South West England BT call centre in an attempt to determine their predictive performance, practical applicability and potential benefits to BT and its customers in the South West of United Kingdom.

The student will be joining the Computational Intelligence Research Group within the Smart Technology Research Centre and will be primarily based in the School of Design, Engineering & Computing in Bournemouth but will also be required to frequently visit and work at the BT Intelligent Systems Labs in Ipswich, BT Call Centre in Exeter and Artificial Intelligence Research Group at Bristol University providing an outstanding opportunity to gain a diverse experience of both academic and commercial environments.

The studentship carries a basic remuneration of £12900 pa tax-free and payment of tuition fees at home/EU rate. The successful applicant will normally need to be an EU citizen though outstanding non-EU candidates will also be considered.

Applicants should have a very strong mathematical background and hold a first or upper second class honours degree or equivalent in computer science, mathematics, physics, engineering, statistics or a similar discipline. Additionally the candidate should have strong programming experience using any or combination of C++, Matlab or Java.

For further details please contact Prof Bogdan Gabrys, e-mail: [bgabrys@bournemouth.ac.uk](mailto:bgabrys@bournemouth.ac.uk) or visit the following www pages: [http://dec.bournemouth.ac.uk/staff/bgabrys/PhD\\_Studentships\\_2008.html](http://dec.bournemouth.ac.uk/staff/bgabrys/PhD_Studentships_2008.html).

Interested candidates should follow the application procedure listed on the School of Design, Engineering and Computing web pages: [http://dec.bournemouth.ac.uk/research/postgraduate\\_research.html](http://dec.bournemouth.ac.uk/research/postgraduate_research.html). Further details concerning the studentship and application procedure can be also obtained from the School of DEC Research Administrator - Ms Jo Sawyer, Email: [jsawyer@bournemouth.ac.uk](mailto:jsawyer@bournemouth.ac.uk). Tel: +44 (0)1202 965985