XI Forum Mathematics-Industry

The ***XI Forum Mathematics-Industry*** was held on 12th February 2016 at the Conference Room of the CITIC (Research Centre on ICT) in A Coruña. The Forum was organized by groups of applied mathematics, statistics and operations research from the three Galician universities that are consolidating their efforts to transfer technology to industry and the productive sector, via the Technological Institute for Industrial Mathematics, ITMATI.

Mathematical models, statistical techniques of artificial intelligence and big data can help the industry to meet their daily challenges: from maximizing production to offer a more personalized service to its customers. Its use is not only limited to large companies but can also be applied, due to its low cost, to SMEs (small and medium-sized enterprises).

In the ***XI Forum Mathematics-Industry*** different success stories were presented. In some of them algorithms were used for financial analysis; in others, to predict the behaviour of digital content readers; and there were also examples of remote management of scattered locals, and optimization of production processes. Often, "most of these success stories are the result of collaboration between different companies and groups of Applied Mathematics, Statistics and Operations Research of the three Galician universities," explains Carlos Vázquez, Professor of Applied Mathematics at the University of A Coruña (UDC) and affiliated researcher of ITMATI and coordinator of this XI Forum.

- Artificial intelligence and data processing techniques help to manage a large network of branches reducing costs, consumptions and personal with minimal resources, "like the electrical system of a country is managed".

- A study by the University of A Coruña on the behaviour of *elpais.es* web users has allowed developing a model of consumer behaviour with applications in different areas.

- The use of simulation algorithms reduces the time of computing the financial risk analysis.

TALKS:

ITMATI, a centre for promoting transfer and innovation.

Mr. Rubén Gayoso Taboada, Executive Manager of ITMATI

The "Technological Institute for Industrial Mathematics (ITMATI)" aims to become a centre of research, innovation, and technology transfer of international reference in the field of Industrial

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Mathematics. This consortium has been an important milestone of sharing resources among the three Galician universities, University of A Coruña, University of Santiago de Compostela and University of Vigo. ITMATI promotes the transfer of mathematical technology providing effective and agile answers to the needs of businesses, industries and government in the fields of Applied Mathematics, Statistics and Operational Research.

Collaborative project in the field of industrial mathematics: University-Business AFI/UDC/ITMATI.

Mrs. Iratxe Galdeano, Partner AFI

Mr. José Antonio García Rodríguez, ITMATI/UDC

A Collaborative project developed between ITMATI researchers at the Department of Mathematics of the UDC and AFI to accelerate the comprehensive risk management in the insurance business by-GPUs- CUDA technology. Within this comprehensive framework, it had been developed the prototype CudALM-Afi for joint management of the module of asset and liability - ALM -. This prototype has been concurrently implemented using graphics processors (GPUs), which allows the use of thousands of processors and a higher bandwidth memory access, thereby obtaining significant savings in computation time with respect to other existing tools in the market. The platform library developed in C ++, leverages the capabilities of the GPU while keeping the characteristics of an object-oriented language features.

Statistical classification of users according to their behaviour in the access and use of digital content in multiplatform.

Mr. Jorge Tomé Hernando, Director of Information Systems Architecture and Quality Assurance.

PRISA Technology.

Mr. José Antonio Vilar, ITMATI/UDC

The Research group MODES of the UDC, as part of the research project carried out with PRISA Digital "Intelligent Technologies for Access and consumption of digital contents in platforms Behaviour" with Acronym Digital HUB, developed an innovative methodology for users of a web portal based on their browsing behaviour. The proposed solution considered cluster analysis techniques based on a measure of dissimilarity between sequences of categorical data that takes into account their time evolution. This proposal enables a proper interpretation of the cluster solution and, unlike other lines in literature based on assuming and estimating probabilistic models for each cluster; the method is free to estimate input parameters and has been successfully tested in simulation studies providing good results. The tool, programmed in open software, faces the

problem of selecting the number of clusters and includes graphs for displaying behaviour patterns characterizing each cluster. Getting taxonomy of users was one of the objectives of the project to the extent that facilitates personalization strategy and content publishing, advertising and e-commerce.

Expert systems for remote management of infrastructures that demand energy. How to measure without measuring tools and how to manage without managers. EcoMT.

Mr. Anxo David Feijóo, General Manager, EcoMT

The "data mining" and artificial intelligence solutions (expert systems etc.) applied to remotely-managed and monitored multipoint installations open possibilities for new management models which will reduce operating costs, improve competitiveness and comfort for customers and workers and help reducing energy demand and CO2 emissions associated with the company. The development and implementation of algorithms and mathematical models to work with patterns and predictive models reduce implementation costs by monitoring and optimizing the resources devoted to managing the "multisite" facilities, thereby minimizing the barriers to implement remote systems management in small and medium-sized enterprises (SMEs) in which the investment capacity for activities that are not "core business" is very limited

Centro de Innovación Aeroespacial de Galicia

Mr. José Antonio Vilán, Commissioner Vigo Tecnólogico, UVIGO.

In this presentation the new "Centro de Innovación Aeroespacial de Galicia (CINAE)", its constitution, patterns, resources, installations and objectives were presented.

Sim4Lean: Development of manufacturing models integrating simulation and computer tools and lean Manufacturing.

Mr. Daniel Prieto Renda, Director of Organization, Soltec Ingenieros

Soltec Ingenieros in collaboration with the Research Group on "Ingeniería de procesos de fabricación" of the UVigo have jointly developed a tool (S4L-Sim4Lean), to analyse manufacturing models integrating computer simulation tools with Lean Manufacturing philosophy applied to decision making on different production strategies.

Industry 4.0 and Technology Transfer to SMEs (first steps).

Mr. José Manuel Iglesias Vilas, CEO Cetus Group, and President of Clúster de la madera y del diseño de Galicia

Statistics, simulation, automation, etc., are features that represent the concept of Industry 4.0, aimed at more efficient management of internal capabilities and focused on adaptability and fast response to emerging trends. To achieve the maximum customization based on maximum standardization; analytical methods of data are an essential tool. In the "Cluster de la madera y del diseño de Galicia", we are taking the first steps to integrate these processes and disseminate in our industrial environment and the entire value chain of our industry.

- Presentation of the masters: Master in Industrial Mathematics (M2i) and Master in Statistic Techniques.

  Mrs. Elena Vázquez Cendón, ITMATI/USC
  Mr. José Antonio Vilar Fernández, ITMATI/UDC

PARTICIPATING ENTITIES AND ENTERPRISES

- AFI
- Centro de Innovación Aeroespacial
- CETUS Group
- Clúster de la madera y del diseño de Galicia
- Grupo PRISA
- EcoMt
- Soltec Ingenieros

FUTHER INFORMATION AND SCHEDULE: XI Forum Mathematics Industry

REPORT AND PHOTOGRAPHS: Mathematical modelling and "big data": a combination that promises to revolutionize the management of small business.

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Opening Ceremony for the XI Forum Mathematics-Industry

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Audience at the XI Forum Mathematics-Industry

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Mrs. Iratxe Galdeano (AFI): *"Collaboration project on the field of industrial mathematics: University-Business AFI/UDC/ITMATI"*.

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Mr. Jorge Tomé (PRISA): *"Statistical classification of users according to their behaviour in the access and use of digital content in multiplatform ".*

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Mr. Anxo David (EcoMT): "*Expert systems for remote management of infrastructures that demand energy. How to measure without measuring tools and how to manage without managers*".

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Mr. José Antonio Vilán (Centro de Innovación Aeroespacial de Galicia)

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Mr. Daniel Prieto (Soltec Ingenieros): *"Sim4Lean: Development of manufacturing models integrating simulation and computer tools and lean Manufacturing"*.

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Mr. José Manuel Iglesias Vilas (CETUS Group and Clúster da Madeira e Deseño de Galicia): *"Industry 4.0 and technology transfer to SMEs. (first steps)"*.

MENTIONS IN THE MEDIA:

- MI-NET Mathematics for Industry Network (04/02/2016)
- Blog de MI-NET Mathematics for Industry Network (04/02/2016)
- Universidade da Coruña (11/02/2016)
- Código Cero (11/02/2016)

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- La Vanguardia (11/02/2016)
- NoticiasGalicia.com (11/02/2016)
- Finanzas.com (12/02/2016)
- AMTEGA (12/02/2016)
- Xunta de Galicia (12/02/2016)
- ABC (12/02/2016)
- Clúster da Madeira e o Deseño de Galicia (16/02/2016)
- Blog Matemática (17/02/2016)

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