

## TECNOLOGÍAS DE INFORMACIÓN, ELECTRÓNICA Y COMUNICACIONES

Grupo de Investigación de Enfoque Estratégico:

### Modelos de Aprendizaje Computacional

Líder del Grupo de Enfoque: Raúl Monroy Borja

raulm@tec.mx

Escuela a la que pertenece:

Escuela de Ingeniería y Ciencias

### OBJETIVO

La audiencia comprenderá el potencial del GIEE en Modelos de Aprendizaje Computacional en la solución de problemas en una gran variedad de dominios, así como las contribuciones al estado del arte en la línea del grupo.

### AGENDA DE ACTIVIDADES (10:10 hrs. a 11:10 hrs.)

- |                     |   |
|---------------------|---|
| 10:10 am            | Presentación del grupo y de las líneas principales de investigación, así como fortalezas que contribuyen a la solución de problemas.<br><a href="#">Raúl Monroy</a> |
| 10:10 am – 10:16 am | DNS-ADVP: A Machine Learning Anomaly Detection and Visual Platform to Protect Top-Level Domain Name Servers Against DDoS Attacks<br><a href="#">Luis A. Trejo</a>   |
| 10:16 am – 10:22 am | Bagging-RandomMiner: a one-class classifier for file access-based masquerade detection.<br><a href="#">Miguel Angel Medina Pérez</a>                                |
| 10:22 am – 10:28 am | FiToViz: A Combined Visualization-Machine Learning Approach for Real-time Risk Situation Awareness.<br><a href="#">Armando López Cuevas</a>                         |
| 10:28 am – 10:34 am | A Linked List-Based Algorithm for Blob Detection on Embedded Vision-Based Sensors.<br><a href="#">Miguel González Mendoza</a>                                       |
| 10:34 am – 10:40 am | An approach based on contrast patterns for bot detection on web log files.<br><a href="#">Octavio Loyola González</a>   |
| 10:40 am – 10:46 am | A review of palmprint feature representations and their performances using a novel methodology.<br><a href="#">Jorge Rodríguez Ruiz</a>                             |
| 10:46 am – 10:52 am | Evaluation measures for node split candidates in decision tree induction: A survey including a theoretical and empirical comparison of the                          |

state-of-the-art.

[Víctor Adrián Sosa Hernández](#)

10:52 am – 10:58 am Clustering faces in the wild.

[Leonardo Chang](#)

10:58 am – 11:04 am Combining one-class classification with pattern extraction and visual analytics for web log analysis.

[Bárbara Cervantes González](#)

### **Semblanza de los expositores:**

**Raúl Monroy:** Raúl Monroy obtained a PhD in Artificial Intelligence in 1998 from Edinburgh University, under the supervision of Prof. Alan Bundy. He has been in Computing at Tecnológico de Monterrey (ITESM), at Estado de México, since 1985. In 2010, he was promoted to (full) Professor in Computer Science. Since 1998, he is a member of the CONACYT-SNI National Research System, currently rank 2. Since 2011, he is a fellow of the Mexican Academy of Sciences. From 2006 to 2007, he was a visitor to both the University of Edinburgh and the DFKI, Saarbrücken, on his sabbatical leave. Dr. Monroy's research focuses on the discovery and application of novel machine learning models for anomaly detection (especially in the context of cybersecurity); the automated use of theorem proving to formal methods of system development; the discovery and application of general search control strategies for uncovering and correcting errors in either a system or its specification; and motion planning.

**Luis A. Trejo:** Obtained a Ph.D. in Computer Science (Parallel Processing) in 1993 from Université Claude-Bernard de Lyon, France. He is a full-time Professor at the School of Science and Engineering, from Tecnológico de Monterrey. Since 2015, he is a member of CONACYT's National Research System, Level 1, and a member of the GIEE-ML (Machine Learning) research group at Tecnológico de Monterrey. His topics of interest are internetworking, Internet of Things, information security, intrusion detection and prevention systems, machine learning, data science, and parallel processing.

**Miguel Angel Medina Pérez:** Received the Ph.D. degree in Computer Science from the National Institute of Astrophysics, Optics, and Electronics, Mexico, in 2014. He is currently a Research Professor with the Tecnológico de Monterrey, Campus Estado de Mexico, where he is also a member of the GIEE-ML (Machine Learning) Research Group. Prof. Medina-Pérez is a member of the Mexican Researchers System (Level C), and a fellow of the Mexican Academy of Computing. His research interests include supervised classification, clustering, data mining, big data, feature selection, one-class classification, masquerader detection, fingerprint recognition, and palmprint recognition. Prof. Medina-Pérez has been involved in several research projects about pattern recognition and he has published 25 research papers, most of them in JCR indexed journals such as "Information Fusion," "Knowledge-Based Systems," "Information Sciences," "Neurocomputing," "Pattern Recognition," and "IEEE Transactions on Information Forensics and Security." Prof. Medina-Pérez has nine years of experience in creating algorithms and developing software for

fingerprint and palm print recognition. A successful example is the algorithm DMC which is the most accurate (according to EER) among those algorithms which compare both fingerprints and palm prints in the international competition FVC-onGoing. He also developed the only fingerprint verification framework in C# publicly available on the Internet (see [www.codeproject.com/Articles/97590/A-Framework-in-C-for-Fingerprint-Verification](http://www.codeproject.com/Articles/97590/A-Framework-in-C-for-Fingerprint-Verification)); this framework got the prize winner in competition "Best C# article of July 2010" at [www.codeproject.com](http://www.codeproject.com), and it has been downloaded more than 120,000 times.

**Armando López Cuevas:** Received the degree in electronic and telecommunication engineering, and a M.Sc. degree in electrical engineering in control theory from the Center for Research and Advanced Studies CINVESTAV Guadalajara, Mexico in 2007 and in 2014 received its PhD at CINVESTAV, Guadalajara, Mexico. He has worked, in both industry and academy. Its main research areas are artificial neural network, computer neuroscience, machine learning and data science. He currently holds a postdoc position at Tecnológico de Monterrey, campus Guadalajara and is member of the Machine Learning Research Group.

**Miguel González Mendoza:** Holds a PhD degree and a Postdoc in Artificial Intelligence from INSA and LAAS-CNRS Toulouse, France, in 2003 and 2004 respectively. Since 2004, he works as professor–researcher, and he is the head of the Graduate Programs on Computer Sciences at Tecnológico de Monterrey, Mexico.

Miguel González Mendoza's research activities are focused on machine learning, semantic web and big data applications, areas in which has supervised 9 PhD and 20 MSc. Theses, published more than 100 peer reviewed scientific publications (JCR and scopus journals, congresses, book chapters & edited books), participated and conducted more than 20 national (CONACYT founded) and international (European founded) research and innovation projects, and chaired 4 international Congresses.

Vicepresident of the Mexican Society for Artificial Intelligence (2015-2016), Secretary (2011-2014), member of the board since 2008. Elected President (2017-2018).

Member of the Mexican National Research System (SNI) rank II (2016-2019), member since 2006. Invited as Young Scientist at the World Economic Forum for New Champions in Tianjin China in September 2012.

**Octavio Loyola González:** Octavio Loyola-González was graduated from University of Ciego de Ávila, Cuba, in 2010. He received the M.Sc. degree in Applied Informatics from University of Ciego de Ávila in 2012. He received his Ph.D. in Computer Science in 2017 from National Institute of Astrophysics, Optics and Electronics, Mexico. He is currently a Research Professor at the Tecnológico de Monterrey's Puebla Campus, where he is also a member of the GIEE-ML (Machine Learning) Research Group. In addition, currently, he is a Member of the Mexican Researchers System (rank 1). His research interests include contrast pattern-based classification, data mining, one-class classification, masquerader detection, fingerprint recognition, and palmprint recognition. Prof. Loyola-González has been involved in several research projects about pattern recognition which have been applied on biotechnology and dactyloscopy problems. Also, he has published several research papers on indexed journals such as "Expert Systems with Applications",

"Machine Vision and Application", "Information Fusion", "Knowledge-Based Systems", "Information Sciences", and "Neurocomputing".

**Leonardo Chang:** Leonardo Chang received his bachelor degree with honors from CUJAE University in Havana, Cuba in 2007, and his M.Sc. and Ph.D. in Computer Science from the National Institute for Astrophysics, Optics, and Electronics (INAOE) of Mexico in 2010 and 2015, respectively, under the supervision of Prof. Enrique Sucar and Prof. Miguel Arias. He was a Researcher at CENATAV, Cuba during 2007-2015, and the Head of the Face Recognition Group of the same institution from 2015 to 2017. Currently, he is a full-time Researcher and Professor at Tecnológico de Monterrey, Mexico. His research interests include biometrics, object recognition, and video-surveillance applications. He has published several papers in top journals and conferences.

**Víctor Adrián Sosa Hernández:** He received his B. S. degree in computer systems from IPN, in 2011, studying at ESCOM. In 2013, he received his master's degree from CINVESTAV-IPN, specializing in the area of multi-objective optimization and evolutionary algorithms. In 2017, he obtained his Ph. D. degree by doing his studies at the computer science department of the CINVESTAV-IPN developing local search strategies based on performance indicators for evolutionary multi-objective optimization algorithms. During his master and Ph. D studies, he made several research stays at the TU Dortmund and the University of Münster, both in Germany. Currently, he is doing a postdoctoral stay in the computer science department at the ITESM-CEM, focusing now his research on the machine learning area. In addition, he is part of the professors' team of the institute. His main research interests are the design of local search techniques, memetic strategies, algorithms for the treatment of dynamic multi-objective optimization problems, the study of the design of decision trees and the combination of machine learning techniques with evolutionary computation.

**Bárbara Cervantes González:** Bárbara completed her bachelor degree at Tecnológico de Monterrey in 2010. She obtained an MSc. in Artificial Intelligence at the University of Edinburgh in 2012; with specialisation in the area of Learning from Data. Bárbara obtained her PhD in Computer Science from Tecnológico de Monterrey in 2017, under the supervision of Raúl Monroy and Miguel González. She has experience working in the higher education industry and in research labs. She has experience and interest in projects in different areas of Artificial Intelligence including machine translation, machine learning, and modelling and data analysis.

**Jorge Rodríguez Ruiz:** Holds a M. Sc. In Computer Science, and a Ph.D in Engineering Sciences, received in 2013 and 2017 from Tecnológico de Monterrey. Previously worked in HP Labs in Palo Alto, California on Machine Learning and Cloud Computing Projects. Currently is a Postdoc with the GIEE-ML, working on latent palmprint and fingerprint identification, as well as a member of the Mexican National Researchers System (SNI) level C. His research interests is the application of machine learning and artificial intelligence for physical and information security.

