SEMINARIO DE LA DIVISIÓN ACADÉMICA DE INGENIERÍA

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Data Science in Screening Complex Systems with Numerous Factors

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Complex systems are pervasive in science and engineering. Some examples include complex engineered networks such as the internet, the power grid and transportation networks. The understanding of such complex systems is limited because their behavior cannot be characterized using traditional techniques of modelling and analysis. Typically, a domain-expert, based on his/her knowledge and experience, can determine which are the variables or factors more significant in just one part of a complex system. However, it is highly questionable that a domain-expert can determine which are the most important factors in a complex system as a whole. Much more questionable is that the domain-expert can determine the most important interactions of the factors for the entire system or even for part of it. Thus, if assumptions have been taken into account to remove factors a priori, conducting an empirical or simulated experiment, as well as its results, is of unreliable accuracy and precision. Moreover, traditional approaches for screening are ineffective for complex systems because of the size of the experimental design. To address this problem, a combinatorial design is used as a screening design for complex systems. Combinatorial arrays exhibit logarithmic growth in the number of factors.

Ph.D. in Computer Science from the Arizona State University, M.S. in Computer Science from ITESM and B.S. in Electronics and Systems from ITESM. Currently developing embedded software for aviation systems at General Electric, GEIQ, Queretaro.
Data Scientist, extensive experience on researching screening engineered systems, data collection, simulation, linear regression modeling, design of experiments and statistical data analysis. Developing custom algorithms for modeling and scripting for automating large simulations, mining BIG data traces and testing. Developing workload characterization, system performance testing and benchmarking of wireless mobile ad-hoc networks, MANETs.