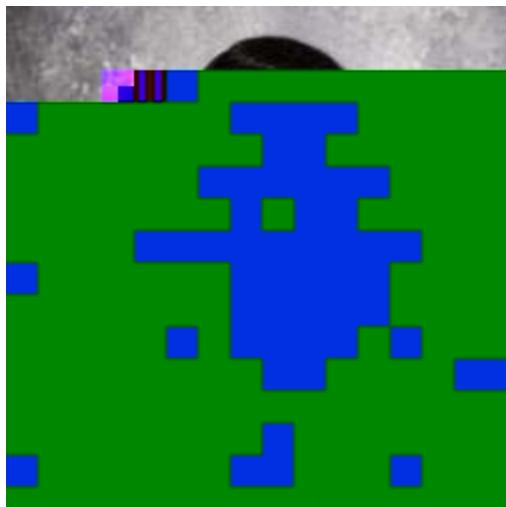


Engineering Management, Information, and Systems

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Ph.D. Dissertation Defense



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Secondly, given what we currently know about the world, how should we decide what to do, taking into account uncertainty of future events and observations that may change our conclusions. Many systems evolve over time and often the next state of the system is not known with certainty, often modeled as a probability distribution over system states. Dealing with such systems especially when we can make a decision at different points in time is difficult due to uncertainty. Making optimal decisions requires understanding the system including its characteristics, how it evolves and changes over time, and how taken actions affect the system. There are multiple dimensions to this problem, and each dimension might require its own specific method. Problem: evolution, a predictive model that is used to extract information from the complicated systems and also a prescriptive model that works as the main decision model and incorporates the effects of actions. In this thesis I consider Partially Observable Markov Decision Process (POMDP) as a framework by combining these methods and demonstrate its use with two applications. I apply the proposed framework to the problem of decision making under uncertainty in complex environments. The proposed framework consists of three main components: a predictive model, a prescriptive model, and a decision-making module. The predictive model is used to extract information from the environment, while the prescriptive model is used to incorporate the effects of actions. The decision-making module uses the information extracted by the predictive model and the effects of actions incorporated by the prescriptive model to make optimal decisions. The proposed framework is evaluated on two applications: a robot navigation task and a resource allocation task. The results show that the proposed framework is able to make optimal decisions in complex environments, even in the presence of uncertainty and partial observability.

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to the problem of diabetes screening and also resource allocation under uncertainty for emergency management. I demonstrate using simulation that implementing the proposed policy will bring about significant improvements in both systems compared to the existing policies.

] } P OE ~~Parzack~~ A malzadeh is a Ph.D. candidate with a major in Operations Research at Lyle school of engineering. He has been a Research and Teaching Assistant at Southern Methodist University since 2016. He received his B.Sc. in Industrial Engineering from Isfahan Un