Abstract

Emergency/rescue helicopters are an essential part of the healthcare systems. Every helicopter should be kept in its best possible operational mode to save the life of the people in danger. For achieving this goal, using an optimal maintenance planning is crucial, which involves a periodic decision about repair or replacement of the components in the helicopter. But, in the considered case study, the spare part inventory is limited and cannot be easily replenished. Also, an observation in this case study is that a repaired component may have a shorter probabilistic lifetime (i.e. time to next failure) in contrast to a brand-new one. The best sequence of decisions can be made for each day of a given planning horizon, when different probabilistic trade-offs for every mission hour are taken into account. The problem is formulated in the framework of a stochastic dynamic program (SDP). For obtaining a fast near-optimal policy, an approximate dynamic program (ADP) is developed, which is based on the Monte-Carlo sampling of the possible paths in the corresponding transition graph of the SDP.

Short Biography

Mehdi Karimi-Nasab finished his PhD in 2013 in *Iran University of Science and Technology*, with a specialization in '*algorithmic optimization*' by publishing in journals such as *European Journal of Operational Research*, *International Journal of Production Research*, and *Computers & Industrial Engineering*. Then, he moved to the *University of Hamburg* in 2015, where he was awarded a two-year *Georg-Forster research fellowship* from the *Alexander von Humboldt foundation*. There, he started a long journey on learning and specializing on '*Stochastic Dynamic Programming* (*SDP*)', '*Markov Decision Process* (*MDP*)' and related issues such as '*curse of dimensionality*', '*analytical solutions*', '*Approximate Dynamic Programing* (*ADP*)', and '*parallelization of computations*'. He enjoyed teaching a portfolio of courses such as '*nonlinear programming*', and '*network optimization*'. In 2021, he worked at the *Technical University of Munich*, and researched on the combination of SDP and '*game theory*', where some decision makers with conflicting objective functions interact with each other over multiple periods in an uncertain environment. Since then, he also researches on game theory in general and on '*stochastic dynamic games*' in particular.