Agent Based Simulation of the Dial-a-Flight Problem

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Abstract

Agent based simulation and modelling (ABSM) has been noted as a novel method in solving complex problems. This dissertation makes use of the ABSM method in conjunction with a Genetic Algorithm to find good solutions to the dial-a-flight problem. The task is to generate a schedule for a heterogeneous fleet of aircraft, with the objective to reduce operational cost but maintain customer satisfaction. By making use of booking list data from an air taxi business, operating in the Okavango Delta, two agent based models were designed, the first makes use of multi-criteria decision analysis (MCDA) and the other a method proposed by Campbell [7], to test their effectiveness against either upper bound or manual solutions. The solution quality varied between tests, with booking list sizes between 10 and 200 requests producing improvements to the upper bound and manual results with a mean improvement from the benchmarks of 1.61\%. The method could also be refined further by adopting improvement mechanisms to final schedules or by making use of retrospective decision making aided by self learning techniques.