Optimization of an Airport Departure Schedule

Bradley Davidson

Abstract

The Optimization of an Airport Departure Schedule project is designed as an extension of a mixed integer linear program (MILP) developed by Gupta, Malik, and Jung which solves the deterministic problem for departure scheduling. While this MILP may be used in various situations to solve the deterministic problem, there remains some ambiguity when it comes to a more general solution which considers extended periods of time and other variables including the locations and crossovers required to move an aircraft into proper position for optimal departure timing. The paper by Gupta, Malik, and Jung suggests using rolling planning horizon methods to solve the problems over the extended periods of time. In this research, this rolling planning horizon method will be investigated further to determine its effectiveness in solving this problem further with probable applications to the Hagerstown Regional Airport to assess the realistic application of the determined efficiencies. Other methods will be investigated in order to uncover a more efficient and versatile model which may be used to solve this optimization more generally than the original MILP proposed.

Predicting Presidential Elections

Joseph Smith

Abstract

The purpose of this project is to use regression analysis to identify some relationships between certain factors in the United States as they relate to the outcome of the presidential election. Data from past elections will be used to develop a reliable predictive model. Said model will be tested using the data and results of the 2016 election.

An Analysis of a NAO Robot

Hannah McDonald

Abstract

NAO is a programmable humanoid robot whose wide range of abilities makes it an ideal candidate for research. Movement design begins with kinematic and dynamic analyses, which determine the relationships between different link parameters. The kinematic analysis will establish the robot's range of motion through a set of matrices relating coordinate position to joint angles. The dynamic analysis calculates the relationships between forces and resulting motions by generating dynamic equations through a recursive algorithm. This study will be beneficial to any future project that involves designing patterns of movement for the NAO robot.

Healthy Networks Design & Research, Inc. BMI Summer Camp Study

Devin Sperry

Abstract

The purpose of this project is to determine the statistical significance of the variables and data recorded in a two-year study of the impact of a summer camp on children's BMI results. Data recorded include age, height, weight, gender, race, waist, school, and BMI result. This project will determine the efficacy of the summer camps by analyzing the correlation of these variables as compared to a control group using various regression techniques incorporated within R and R Studio. This project aims to evaluate the impact of the camps, namely how best to utilize their techniques to provide the greatest desired results in changing children's BMIs.