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**Mathematics and Computer Science**

**2016**

**Predicting El Niño Characteristics using Recursive Models, Data Trees, and an Evolutionary Algorithm**

The objectives of this project were to predict future values of El Niño characteristics using recursive equation models, data trees, and an evolutionary algorithm, and to find how number of generations and tree size influenced prediction accuracy.

A Python program was written in order to generate a model for a data set and test its accuracy. First, the program generated various models which combined recent past data with basic arithmetic operations to make predictions. These models were represented using a tree. The program then tested all models against training data. Poor models were replaced by new ones, and random changes were carried out. This process of testing and changing the tree, called a generation, was repeated various times. Finally, the accuracy of the model which best fit the training data was measured by comparing its predictions to testing data.

Three different characteristic values of El Niño, each measuring a different quantity, were tested. For each, the program generated and tested models after 10, 50, and 100 generations and with different tree sizes.

Ultimately, this program had success in predicting values of two characteristics, but did not succeed at predicting the third. Also, number of generations had little effect on accuracy, while increased tree size led to increased accuracy.

The successes of the model satisfied the objective and indicate potential for improvements in future testing and as a basis for more complex models. Furthermore, the program’s generality indicates possible success in predicting both other El Niño characteristics and any time series.