Scott Farley
Trewartha/Oldebolt Conference Travel Fellowship Application
September 8, 2016

Conference:
American Geophysical Union (AGU) Fall Meeting
San Francisco, CA
December 12-16, 2016

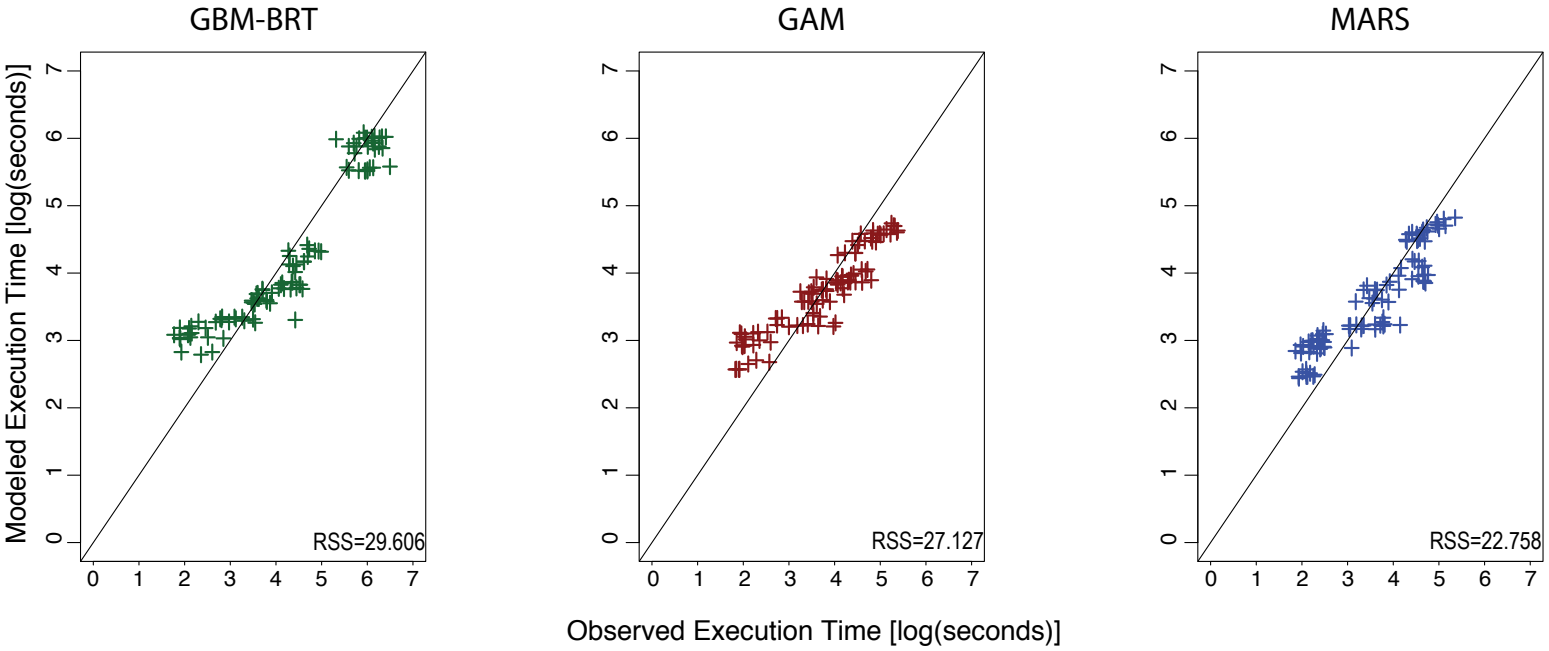
Poster Title:
Optimizing Computing Platforms for Climate-Driven Ecological Forecasting Models

Session Title:
Architecture and Integration Testbed for Earth/Space Science Cyberinfrastructures

Abstract:
Species distribution models are widely used, climate-driven ecological forecasting tools that use machine-learning techniques to predict species range shifts and ecological responses to 21st century climate change. As high-resolution climate and biodiversity data becomes increasingly available and statistical learning methods become more computationally intensive, choosing the correct computing configuration on which to run these models becomes more important. With a variety of low-cost cloud and desktop computing options available, users of forecasting models must balance performance gains achieved by provisioning more powerful hardware with the cost of using these resources. We present a framework for estimating the optimal computing solution for a given modeling activity. We argue that this framework is capable of identifying the optimal computing solution – the one that maximizes model accuracy while minimizing resource cost and computing time. Our framework is built on constituent models of algorithm execution time, predictive skill, and computing cost. We demonstrate the results of the framework using four leading species distribution models: multivariate adaptive regression splines, generalized additive models, support vector machines, and boosted regression trees. The constituent models themselves are shown to have high predictive accuracy, and can be used independently to estimate the effects of using larger input datasets, such as those that incorporate data from the fossil record. When used together, our framework shows highly significant predictive ability, and is designed to be used by researchers to inform future computing provisioning strategies.

Budget Estimate:
Conference Registration: $255
Airfare (MSN-SFO Roundtrip): ~$450
Lodging (5 nights in San Francisco): ~$400
Meals (5 days): $350
Total: $1,455

Linear Runtime Model



GBM Runtime Model