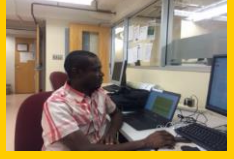
TOPIC	Generalized Additive Modeling of Nonstationary Extreme Events with Application to Precipitation Extremes in Southeastern United States
AREA	Control, Machine Learning, Data mining and Extreme events
SPEAKER	Norbert Agana, PhD students, ACIT Center, North Carolina A&T State University
DATE	1 July 2015, Wednesday
TIME	11:00 AM to 12:00 AM
VENUE	ACIT Center, Room 342, Fort IRC Bldg, North Carolina A&T State University, 1601 East Market Street, Greensboro, NC 27411
FEES	No Charge

SYNOPSIS

Extreme events pose significant consequences in many fields of science and engineering. The variability and seasonal fluctuation in frequency and magnitude of these events strongly influence the social and natural environments throughout the world with consequent impacts on natural resources and economy. As a result, there has been continuous efforts from both engineers and scientists to understand this variation develop accurate models that are capable of explaining the variations. The extreme value theory (EVT) has provided the basis for the use of statistical models to study extreme events. One probability distribution that form the foundation of the EVT is the generalized extreme value distribution (GEV) where samples are assumed to be independent and identically distributed (iid). But this assumption is not usually fulfilled in many real life situations. In order to achieve realistic extreme events models, explanatory variables or covariates which have influence on extremes occurrences have to be incorporated into the models. The effect of covariates can be considered in a number of forms. Linear or polynomial relationships are common forms of expressing response variables in terms of explanatory variables. However, estimating the distribution parameters using these linear or quadratic relationships may be restrictive since the parameters can assume different forms. In this research, we model extreme events in a nonstationary framework using a flexible data-driven approach called the Vector Generalized Additive Model (VGAM). The method is applied to a 100-year monthly precipitation records in the Southeastern US. The proposed GEV-VGAM model is developed to study the GEV model with covariates where the dependence structure is represented by smooth functions. We characterize the nonstationarities in the precipitation events and the related climate variables by expressing the distribution parameters of the GEV distribution as smooth functions of explanatory variables such as time, the El Nino Southern Oscillation (ENSO) and the North Atlantic Oscillation Index (NAO). Results obtained using the GEV-VGAM model show an improvement over previous work where linear trend in covariates were used.

ABOUT THE SPEAKER



Norbert Agana received his BSc in mathematics and MSc in electrical engineering from University of Cape Coast and Tuskegee University respectively. He is a PhD student in electrical and computer engineering at North Carolina A&T State University. His interest areas are machine learning data mining and extreme events modelling.