**Forecasting runoff using time series data and RNN**

**Introduction:**

Flooding is increasingly becoming one of the most difficult challenges to tackle. As the population is increasing, there is more urbanization resulting in more impervious developments, which results in decrease of infiltration and increase of runoff (sometimes resulting in flooding). If we can predict the runoff in advance, we might be able to predict if there is going to be flooding event in future. I will use time series of weather data (such as rainfall, temperature etc.) from NCDC and other data such as land use, soil, management to develop a multivariate recurrent neural network. This model can be used to predict future runoff using forecasted weather data.

**Objective:**

The objective is to build a RNN time series model that can predict future runoff using forecasted weather data.

**Potential Beneficiaries:**

The model can be used by people who are related to development of real state, by state and government agencies and by insurance industry.

**Dataset Availability:**

We will develop the model for Fish River Watershed in Alabama. The runoff data will be used for training the model and can be downloaded from USGS website.

Weather data set can be downloaded from:

<https://www.ncdc.noaa.gov>

**Methodology:**

All the codes for this project will be developed using python language. I will start the project with data ingestion from the csv files, cleaning the data using data wrangling techniques. Next step, would be to perform exploratory analysis by analyzing the effect of independent variables on the dependent variable (runoff). Calculate initial statistical inferences from the data samples.

Divide the data into training and testing datasets. Use the training dataset to develop a multivariate time series model using Keras. Test the dataset using the rest of the testing dataset. Score the dataset based on the model performance during training and testing phase.

**Deliverables:**

The deliverables for this project will include codes used for the exploratory analysis and model development, results in the form of jupyter notebook and a report presenting the exploratory analysis, model, results, discussion and conclusions.