Natural Resources Management

Final Project

Dataset: **8. Gabcikovo**

# Part 0. Data pre-processing

## Dataset times

Total dataset total years and years used for training, taking 70% of the dataset

## Dataset partition

## Cyclostationary analysis

## Correlations

### Streamflow - Precipitations

### Streamflow - Temperature

## Data normalization

## Correlations

### Streamflow - Precipitations

### Streamflow - Temperature

# Part 1. 1-day ahead forecast model

## Linear models

### AR (n)

To find the best AR(n) model possible, the R2 index is evaluated for each model.

### Proper ARX (1,1)

### Improper ARX (1,1)

## Nonlinear models

### Proper ANN

The model used is an ANN with 3 neurons, iterated 10 times to find the best model possible.

### Improper ANN

### CART

The leaf size is iterated between 1 and 40 to find the optimal leaf size

Then is compared with the algorithm that finds the optimal solution by a smart search of params

## Models comparison

The result is that the model with the best performance (r2=0.968) is the AR(9), but a simper model as the ARX(1,1) (r2=0.962) gives almost the same, then the most suitable to implement is this one. It can be improved looking for more complex models. At the same time, the proper ANN(3) has a good performance, it can be improved adding more neurons, but taking the risk of overfitting.

# Part 2. Damming policies

## Dam sizing

TODO: Target release

### Rippl criteria

### Sequent Peak Analysis criteria

## Define Standard Operating policy

TODO: How to define the max release possible wrt the height?

One alternative is to use the value up to the mean + one standard deviation.

TODO: Where can be found the suitable parameters for the lake, to determine the natural release

## Trajectories Alternative-0 vs SOP

## Indicators

### Reliability

### Flooding 1