

# An Intelligent Analytics System for Real-Time Catchment Regulation and Water Management

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# Problem Description

- ▶ Scope of IDSS:
  - ▶ Deliver real-time decision support for water management and catchment regulation with reflection to biodiversity protection and reservation
- ▶ Data sources:
  - ▶ Sensor data from seven stations in Usk reservoir (daily intervalls)
  - ▶ Real-time rainfall data from UK Met Office weather service
  - ▶ Artificial Neural Network for predicting river depth, river flow and rainfall
- ▶ Goals:
  - ▶ Achieve a more comprehensive catchment management process
  - ▶ Make improvements in the way water is optimized
  - ▶ Assess risk and take informed decisions for regulating the water ecosystem

# Architecture of IDSS

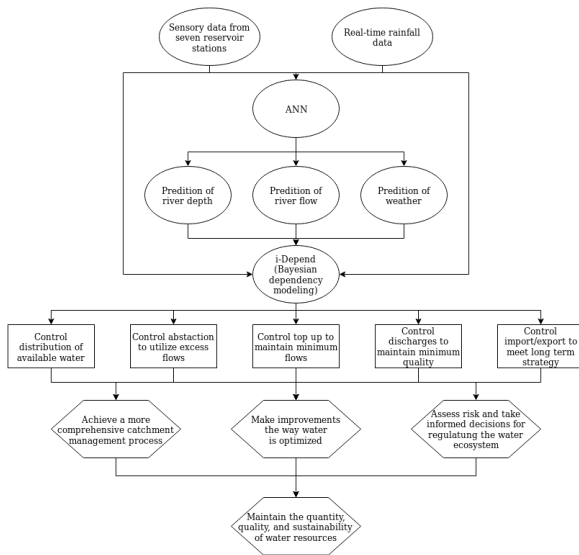


Figure: Graphical scheme of the Decision Support System.

# Methods

Combination of two Methods:

- ▶ Artificial Neural Network (ANN) - The ANN module predicts a five day forecast for river depth, river flow and weather based on real-time data fetched from the river stations
- ▶ Bayesian Belief Network - For extracting knowledge from the ANN a dependency modeling tool called *i-Depend* is used. It uses a Bayesian probabilistic approach to measure the impact of one decision over another

# Evaluation

- ▶ Evaluation of ANN:
  - ▶ Comparison of accuracy with related forecasting algorithms such as SVM and temporal series
  - ▶ Lowest error was achieved with ANN
  - ▶ Comparison between ANN predicted river depth and real river depth (as recorded from stations) for three random stations within the reservoir
- ▶ Evaluation of IDSS:
  - ▶ Comparison of outputs with real data
  - ▶ Evaluation on use case at seven stations alongside the Usk River

Thank You!