

Application of artificial neural network technique in real flood forecasting

Ri Ho Yong

Institute of Hydrology, State Hydrometeorological
Administration(SHMA), D.P.R of Korea

Climate

- ✓ The precipitation in D.P.R.K is plentiful with an average annual rainfall of 1000 to 1200mm.
- ✓ Floods occur in June to September and are closely related to the movement of southwest and southeast monsoons.
- ✓ Recently, frequent occurrence of flood due to the heavy rainfall is causing great damage to human lives and economic activities in D.P.R.k.

Flood by torrential rainfall in
D.P.R.K, 7 to 12 August 2007

Cumulative rainfall, 7 to 12 August 2007

Station name	Rainfall(mm)
Phyonggang county, KangWon Province	662
PukChang county, South Phyongan Province	672
SinPhyong County, North Hwanghae Province	592
SinPhyong county, South Hamgyong Province	399
Pyongyang	460

Flood disaster in Pyongyang

- Unprecedented heavy rains poured in the upper and middle reach of Tae Dong river, 7 to 11 August.
- The average rainfall in this period was 524mm, 52mm more than 472mm in the period from August 25 to 29, 1967

Flood disaster...

- ✓ The water level of Tae Dong river rose rapidly by the week-long rainfalls. 13,650/s of water per second flew in the Tae Dong river at 21:00 on August 11. Its water level reached the dangerous stage.
- ✓ On top of this, the highest tide of the West Sea of Korea brought difficulties to manage the water of the river.
- ✓ It resulted in hitting low-lying areas of the city and its suburbs.

Flood disaster...

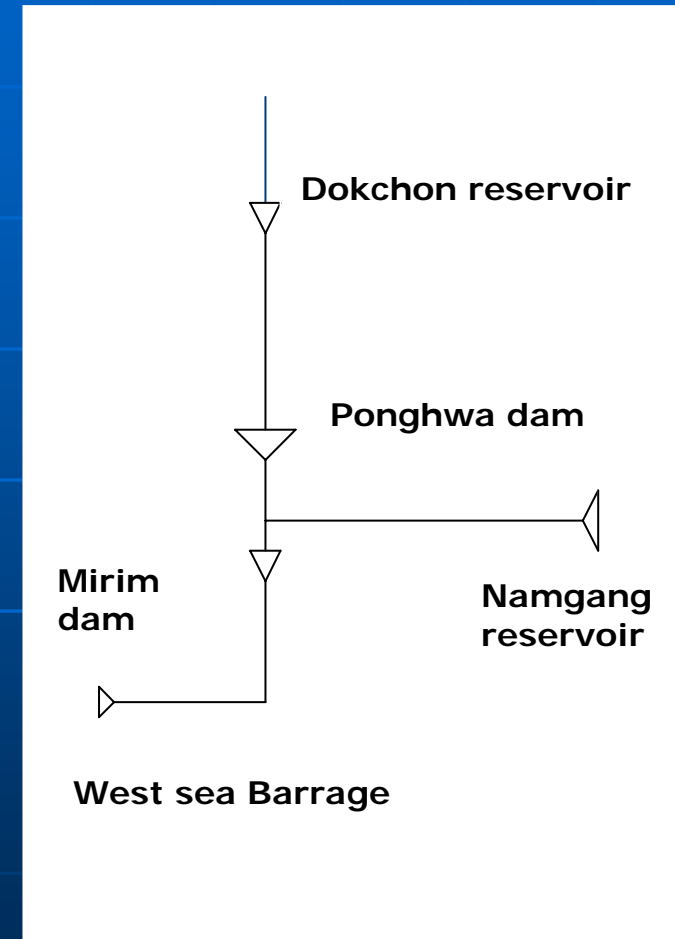
- Some streets of Potonggang, Mangyongdae, Phyongchon and Central districts were submerged under two meters of water, suspending traffics and breaking the supply of electricity and communication networks.
- The beautiful parks in Panwol, Ssuk, Konyu and other islets and on the sides of the river were buried under silt beyond recognition

Real time flood forecasting using ANN

- ANN has been proven particularly efficient for problems in which the internal characteristics are difficult to be described by physical equations such as hydrologic processes.
- The study presented in the paper has investigated the capability of the ANN technique for real-time flood forecasting.

Early warning and flood management

- Timely and accurate forecasting and warning of flood through TV, radio
- Optimal operation of reservoirs and dams, in particular Namgang reservoir and west sea Barrage, to decrease the flood peak



Multi reservoir framework in Tae dong river

Conclusion

- ANN model appears to apply and its data requirements are limited to rainfall and river flow measurements.
- Compared with traditional hydrologic models, the principal advantage of the ANN approach is that the forecasting model could be constructed and the required parameters could be estimated easily using the ANN technique without detailed consideration of the catchment characteristics.
- The results obtained in this study provide the evidence that the model can offer satisfactory results with high accuracy for real time forecasting.

Thank you



XINHUANET



XINHUANET



XINHUANET/REUTERS



XINHUANET/REUTERS



XINHUANET