**Performance Improvement of Support Vector Machine**

**Technique for Monthly Rainfall Forecasting**

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**Abstract:** Achievement of reliable and accurate forecasts of precipitation is one of today's challenging issues in water resources planning and management, and climate hazards mitigation. Even though a great amount of research has been conducted on application of data-driven techniques for hydro-climatic forecasting, but selecting best combination of inputs to such models is yet controversial among the community of modellers. The main objective of this study is to improve the performance of support vector machine (SVM) nonlinear model by Gamma Test (GT) and correlation analysis (CA) in forecasting monthly precipitation. For this purpose, Monthly climatic time series of Shiraz synoptic station, located in Fars province of Iran were employed during a 28-year period, 1983-2011, as a case study. The obtained results indicate that the coupled Gamma Test-Support Vector Machine (GT-SVM) model is able to provide more accurate forecasts of monthly rainfall compared to pure SVM model and also the coupled correlation analysis-Support Vector Machine (CA-SVM) model. The GT-SVM model yields R2=0.94 and RMSE=2 mm compared to (CA-SVM) model with R2=0.86 and RMSE=2.97 mm. To further improve the SVM model performance, using robustness of Gamma Test is proposed as one of the non-linear modelling tools.

**Keywords:** rainfall forecasting, support vector machine, Gamma test, model inputs selection, Shiraz synoptic station, Iran