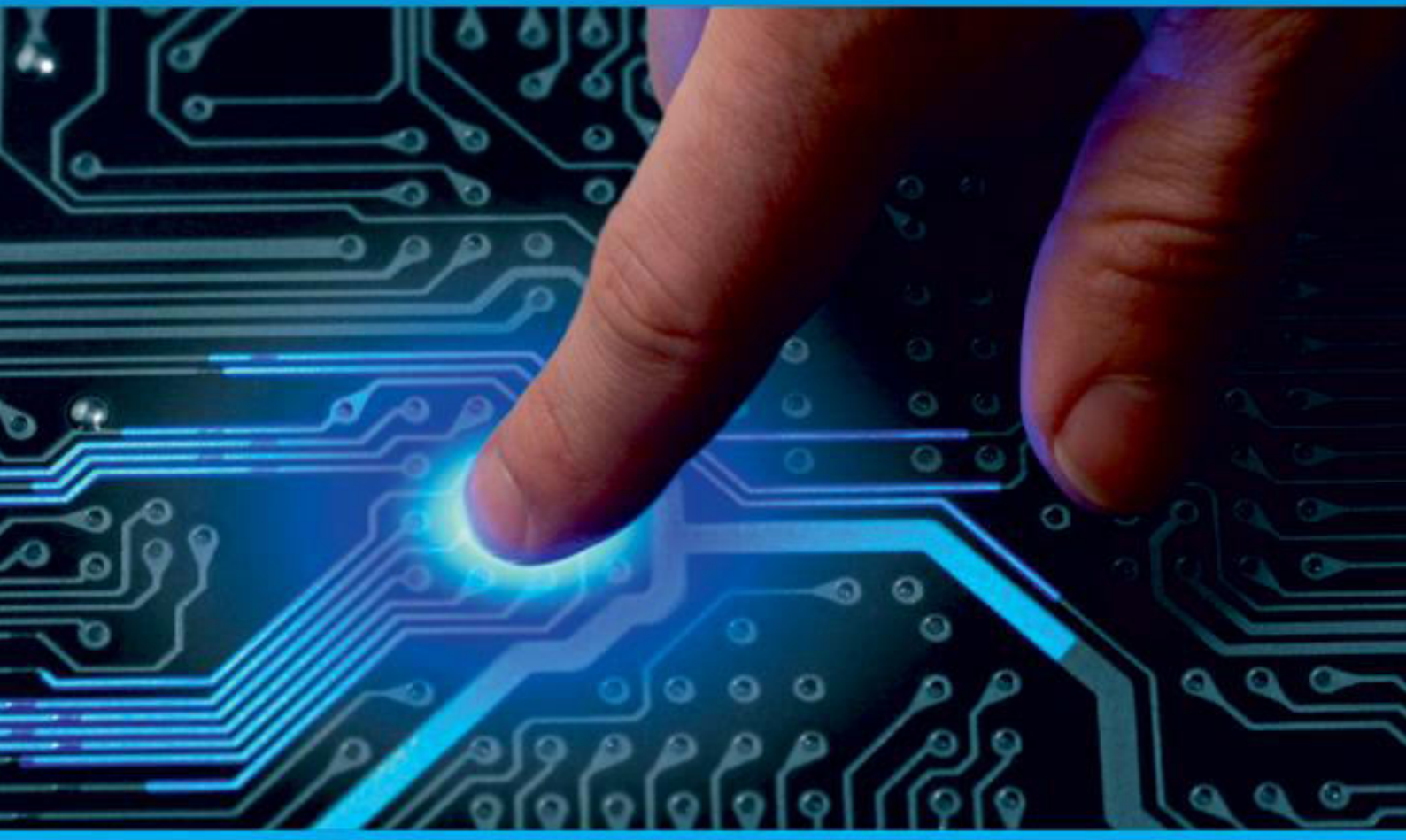
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 9, September 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 9, September 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1009012 |

Monitoring and Detection of Natural Disasters Using Adaptive Machine Learning Models

Dr.D J Samatha Naidu , V.Venkata Kumar

Principal, Annamacharya PG College of Computer Studies, Rajampet, India

MCA, Annamacharya PG College of Computer Studies, Rajampet, India

ABSTRACT: Floods are among the most destructive natural disasters, which are highly complex to model. The research on the advancement of flood prediction models contributed to risk reduction, policy suggestion, minimization of the loss of human life, and reduction of the property damage associated with floods. To mimic the complex mathematical expressions of physical processes of floods, during the past two decades, machine learning (ML) methods contributed highly in the advancement of prediction systems providing better performance and cost-effective solutions. Due to the vast benefits and potential of ML, its popularity dramatically increased among hydrologists. Researchers through introducing novel ML methods and hybridizing of the existing ones aim at discovering more accurate and efficient prediction models. The main contribution of this paper is to demonstrate the state of the art of ML models in flood prediction and to give insight into the most suitable models. In this paper, the literature where ML models were benchmarked through a qualitative analysis of robustness, accuracy, effectiveness, and speed are particularly investigated to provide an extensive overview on the various ML algorithms used in the field. The performance comparison of ML models presents an in-depth understanding of the different techniques within the framework of a comprehensive evaluation and discussion. As a result, this paper introduces the most promising prediction methods for both long-term and short-term floods. Furthermore, the major trends in improving the quality of the flood prediction models are investigated. Among them, hybridization, data decomposition, algorithm ensemble, and model optimization are reported as the most effective strategies for the improvement of ML methods. This survey can be used as a guideline for hydrologists as well as climate scientists in choosing the proper ML method according to the prediction task.

KEYWORDS : flood prediction; flood forecasting; hydrologic model; rainfall–runoff, hybrid & ensemble machine learning; artificial neural network; support vector machine; natural hazards & disasters; adaptive neuro-fuzzy inference system (ANFIS); decision tree; survey; classification and regression trees (CART), data science; big data; artificial intelligence; soft computing; extreme event management; time series prediction

I. INTRODUCTION

Among the natural disasters, floods are the most destructive, causing massive damage to human life, infrastructure, agriculture, and the socioeconomic system. Governments, therefore, are under pressure to develop reliable and accurate maps of flood risk areas and further plan for sustainable flood risk management focusing on prevention, protection, and preparedness [1]. Flood prediction models are of significant importance for hazard assessment and extreme event management. Robust and accurate prediction contribute highly to water recourse management strategies, policy suggestions and analysis, and further evacuation modeling [2]. Thus, the importance of advanced systems for short-term and long-term prediction for flood and other hydrological events is strongly emphasized to alleviate damage [3]. However, the prediction of flood lead time and occurrence location is fundamentally complex due to the dynamic nature of climate condition. Therefore, today's major flood prediction models are mainly data-specific and involve various simplified assumptions [4]. Thus, to mimic the complex mathematical expressions of physical processes and basin behavior, such models benefit from specific techniques e.g., event-driven, empirical black box, lumped and distributed, stochastic, deterministic, continuous, and hybrids [5].

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 9, September 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1009012 |

II. RELATED WORK

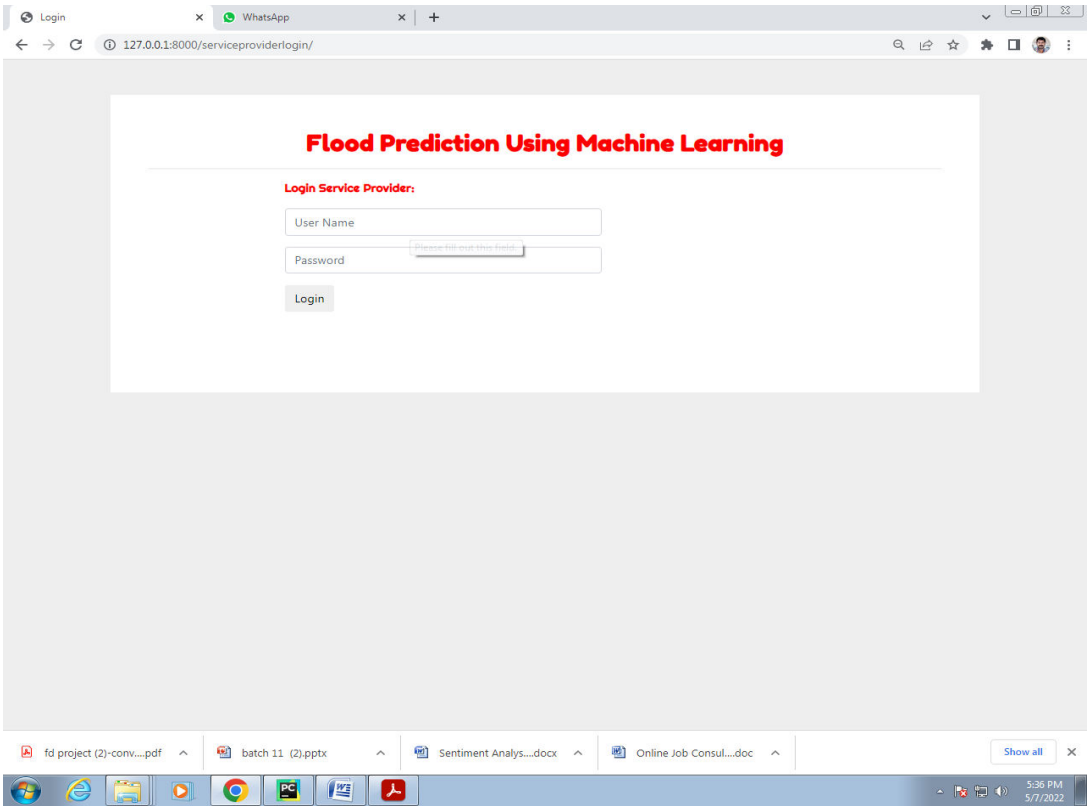
The drawbacks of the physically based and statistical models mentioned above encourage the usage of advanced data-driven models, e.g., machine learning (ML). A further reason for the popularity of such models is that they can numerically formulate the flood nonlinearity, solely based on historical data without requiring knowledge about the underlying physical processes. Data-driven prediction models using ML are promising tools as they are quicker to develop with minimal inputs.

III. PROPOSED MODEL

The project addresses the problem of forecasting the river flow on the basis of rainfall and runoff data.

- The objective of the paper was twofold: one was to demonstrate the potential of the Random Forest Regression (RF) computing paradigm in modeling the rainfall-runoff process; and second was to evaluate the relative merits and demerits of this paradigm with reference to already popular SVM, ANN and GP modeling approaches.
- The study suggests that the RF model is able to capture the inherent nonlinearity in the rainfall-runoff process better than the other three, and is able to forecast flows satisfactorily up to 5 hours in advance.

IV. RESULTS

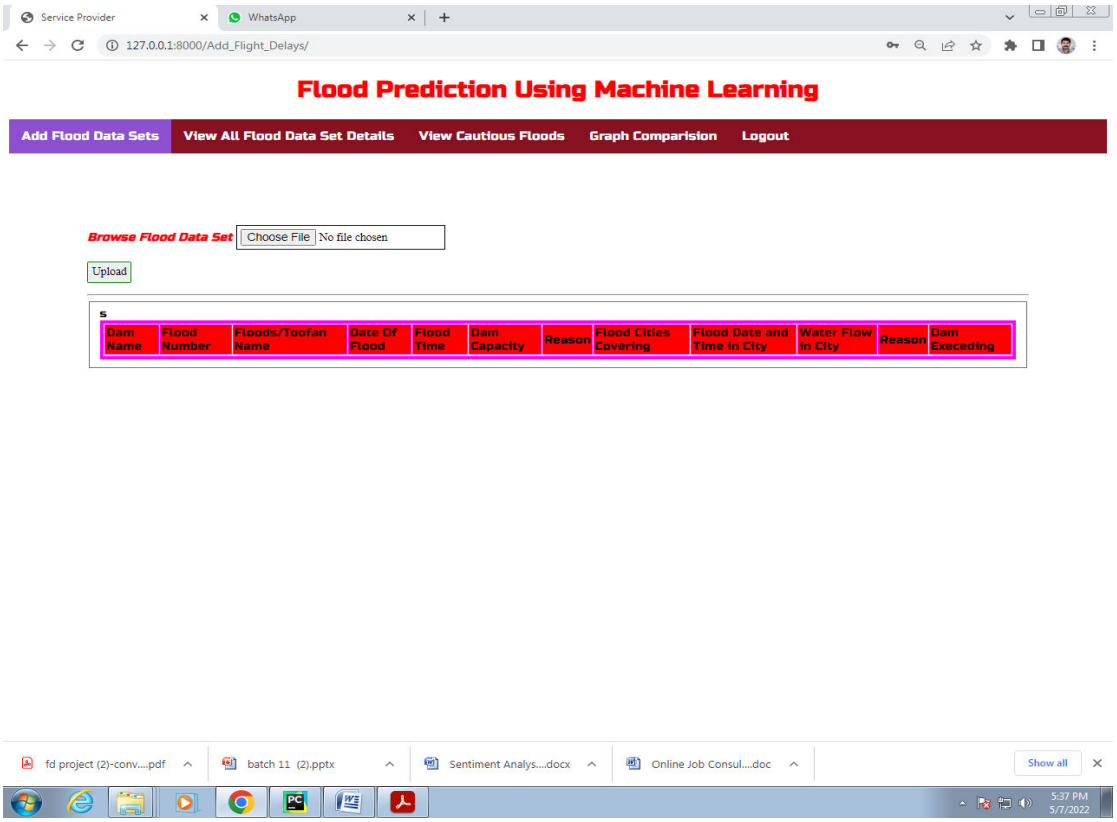


Screen 1 : **Admin Login Page**

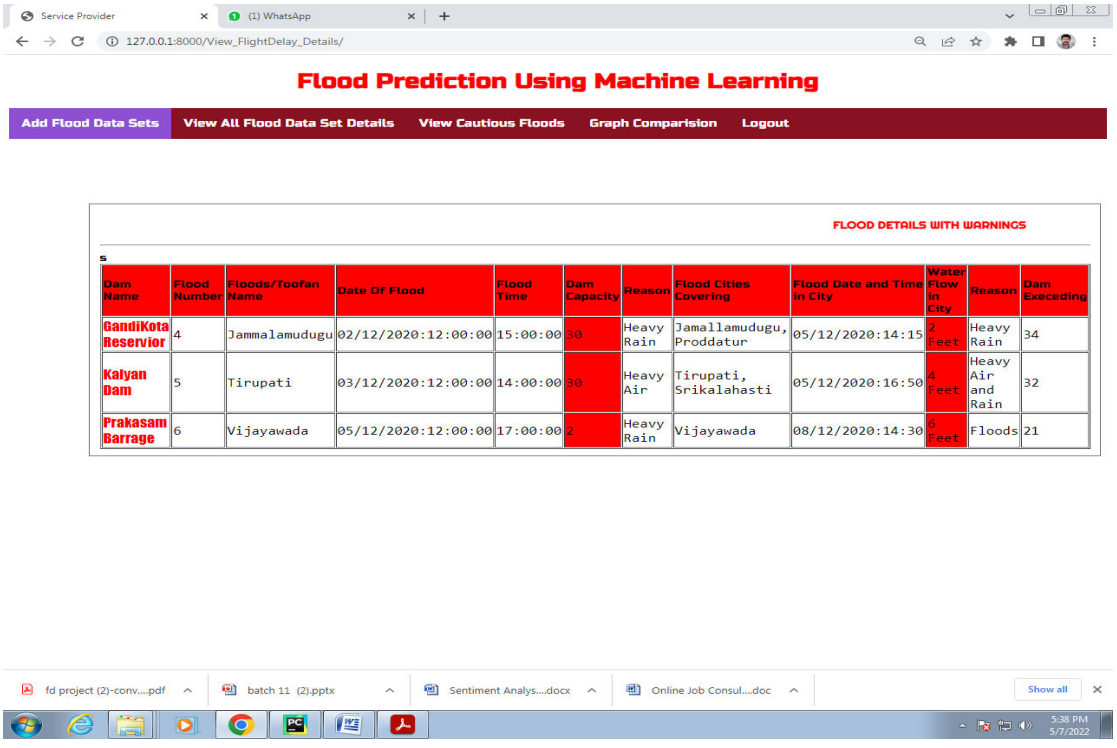
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 9, September 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1009012 |



Screen 2: Upload Floods Data Set

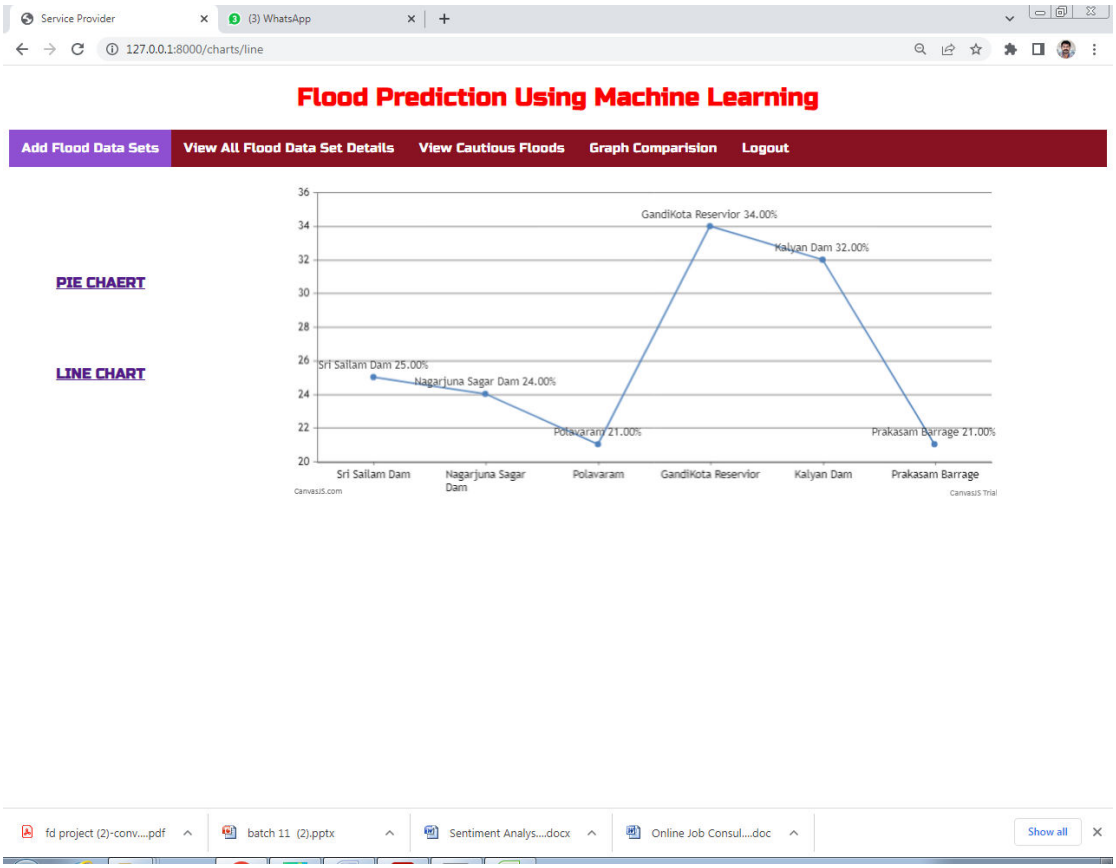


Screen 3: View Floods Cautions Data

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 9, September 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1009012 |



Screen 4 : Line Graph Showing Floods Reservoir Wise

V. CONCLUSION AND FUTURE WORK

The proposed Flood Prediction Analysis has been successfully implemented and tested with the available data. This is one of the best methods to predict the occurrence of flood. For future enhancements we can include ML Deployment of the application .Updating data utilizing live Information from sensors .Inserting more rescue groups as helpline .Also using advanced datasets taking into consideration climate change.

In future, the work can be extended Apache System ML software that supports python programming. This system will indicate the flood well before its occurrence thus providing the safety alert for future affecting area. The collection of large data for prediction can be implemented using machine learning involving python programming

REFERENCES

1. Danso-Amoako, E.; Scholz, M.; Kalimeris, N.; Yang, Q.; Shao, J. Predicting dam failure risk for sustainable flood retention basins: A generic case study for the wider greater manchester area. *Comput. Environ. Urban Syst.* **2012**, *36*, 423–433. [CrossRef]
2. Xie, K.; Ozbay, K.; Zhu, Y.; Yang, H. Evacuation zone modeling under climate change: A data-driven method. *J. Infrastruct. Syst.* **2017**, *23*, 04017013. [CrossRef]
3. Pitt, M. *Learning Lessons from the 2007 Floods*; Cabinet Office: London, UK, 2008.
4. Lohani, A.K.; Goel, N.; Bhatia, K. Improving real time flood forecasting using fuzzy inference system. *J. Hydrol.* **2014**, *509*, 25–41. [CrossRef]
5. Mosavi, A.; Bathla, Y.; Varkonyi-Koczy, A. Predicting the Future Using Web Knowledge: State of the Art Survey. In *Recent Advances in Technology Research and Education*; Springer: Cham, Switzerland, 2017; pp. 341–349.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 9, September 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1009012 |

6. Zhao, M.; Hendon, H.H. Representation and prediction of the indian ocean dipole in the poama seasonal forecast model. *Q. J. R. Meteorol. Soc.* **2009**, *135*, 337–352. [CrossRef]
7. Borah, D.K. Hydrologic procedures of storm event watershed models: A comprehensive review and comparison. *Hydrol. Process.* **2011**, *25*, 3472–3489. [CrossRef]
8. Costabile, P.; Costanzo, C.; Macchione, F. A storm event watershed model for surface runoff based on 2D fully dynamic wave equations. *Hydrol. Process.* **2013**, *27*, 554–569. [CrossRef]
9. Cea, L.; Garrido, M.; Puertas, J. Experimental validation of two-dimensional depth-averaged models for forecasting rainfall–runoff from precipitation data in urban areas. *J. Hydrol.* **2010**, *382*, 88–102. [CrossRef]
10. Fernández-Pato, J.; Caviedes-Voullième, D.; García-Navarro, P. Rainfall/runoff simulation with 2D full shallow water equations: Sensitivity analysis and calibration of infiltration parameters. *J. Hydrol.* **2016**, *536*, 496–513. [CrossRef]
11. Caviedes-Voullième, D.; García-Navarro, P.; Murillo, J. Influence of mesh structure on 2D full shallow water equations and SCS curve number simulation of rainfall/runoff events. *J. Hydrol.* **2012**, *448*, 39–59. [CrossRef]
12. Costabile, P.; Costanzo, C.; Macchione, F. Comparative analysis of overland flow models using finite volume schemes. *J. Hydroinform.* **2012**, *14*, 122. [CrossRef]

BIOGRAPHY

V.Venkata kumar is a Research in the Information Technology Department, College of Annamacharya pg college of Computer studies, JUNTA. He received Master of Computer Application (MCA) degree in 2022 from Rajampeta.

Dr DJ Samatha naidu principal, Annamacharya PG College of Computer Studies,Rajampet having 17 years teaching and 2 years Industry experience, International journal 46 published national conferences 60 and International conferences 28 papers presented . Received 6 national awards 2 International awards from various event organizations.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details