RUAHA CATHOLIC UNIVERSITY

RUCU

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY .

DEPARTMENT OF COMPUTER SCIENCE.

COURSE NAME: RESEARCH METHODS.

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Title of the Paper and Authors

Title: Automation of Irrigation System Using ANN-based Controller

Authors: S. Muhammad Umair & R. Usman

Summary of the Introduction

The introduction emphasizes the importance of irrigation in agriculture as a key factor influencing crop productivity. Traditional irrigation methods rely heavily on manual control, which makes the process time-consuming, labor-intensive, and inefficient especially for large farms.

The authors highlight that the timing and amount of irrigation have a direct effect on crop growth and yield. When irrigation is done too early, too late, or in excess, farmers experience reduced productivity and economic losses. Although several irrigation scheduling techniques have been proposed, many existing systems still depend on simple ON/OFF controllers that provide water without considering real-time environmental conditions.

Because critical parameters such as soil moisture, humidity, temperature, radiation, and wind speed keep changing, the outdated systems fail to optimize water usage. To address these limitations, the paper proposes an Artificial Neural Network (ANN)-based intelligent irrigation system that can model environmental variations and improve decision-making for better water conservation and crop performance.

Summary of the Problem Statement

The problem addressed in the paper is that **traditional irrigation systems are inefficient and non-adaptive**. Which cause

Environmental variability: Factors such as humidity, temperature, and wind speed change continuously, but conventional systems cannot respond to these variations.

Water and energy wastage: Because of uncontrolled irrigation cycles, traditional systems over-irrigate or under-irrigate, leading to poor soil moisture stability and resource losses.

Absence of intelligent decision-making: Conventional systems cannot predict evapotranspiration or crop water demand, resulting in poor irrigation scheduling.

Objectives of the Paper

Main objective: To design and develop Automation of Irrigation System Using ANN-based Controller

Specific objectives:

- To design and implement an ANN-based intelligent irrigation controller
- To model key environmental parameters
- To compare ANN performance with classical ON/OFF controllers
- To simulate and validate the proposed model in MATLAB

Research Gap Identified in the Paper

1. **Limited application of AI/ANN** in irrigation management, despite its potential in prediction and optimization.
2. **Lack of adaptive controllers** in traditional irrigation systems, which fail to respond to environmental changes.
3. **Absence of real-time decision-making**, leading to wastage of water and energy in fixed-rate irrigation systems.
4. **No feedback-based intelligent irrigation solutions**, as many systems do not use sensor data effectively.

REFERENCES

Umair, S. M., & Usman, R. (Year). *Automation of irrigation system using ANN-based controller*. Journal/Conference Name, Volume(Issue), pages.