# INDEX

CHAPTER

# 27

# Role and Regulation of Osmolytes and ABA Interaction in Salt and Drought Stress Tolerance

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# Chapter 29 - Osmolyte Diversity, Distribution, and Their Biosynthetic Pathways

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## Abstract

Many abiotic stresses trigger the biosynthesis of diverse low-molecular-weight organic solutes called osmolytes in many plants. This encompasses a variety of compounds like amino acids (notably proline), tertiary sulfonium (dimethylsulfoniopropionate (DMSP)) and quaternary ammonium compounds (e.g., glycine betaine, proline betaine (also known as stachydrine), β-alanine betaine, pipecolate betaine (also known as homostachydrine), hydroxypipecolate betaine and choline-*O*-sulfate, trigonelline (nicotinic acid betaine)), sugar alcohols (mannitol, sorbitol, pinitol), and others in many species. The quaternary ammonium compounds and also DMSP are derived from amino acid precursors. Multiple pathways exist for their biosynthesis in bacteria and higher plants and so, the regulation is highly complex. Biosynthetic pathways and the genes associated in the biosynthetic pathways of many osmolytes have been identified, validated in different plants for their role in abiotic stress tolerance. However, in many pathways, the pathway intermediates and the genes that encode the enzymes are still not known comple

Previous Next

## Keywords

Osmolyte diversity; osmolyte biosynthesis; osmolyte distribution; proline derivatives; glycine betaine derivatives; sugars and sugar alcohols

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# Predicting Student Performance with ANNQ3H: A Case Study in Secondary Education

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*Abstract*— **In late advancements, Educational foundations chasing and persevering best execution from the understudies. So, the Educational Institutions are endeavouring to improve the presentation of understudies in scholastics in this article an Artificial Neural Network model built using the Quick method with 3 Hidden layers (ANNQ3H) implemented in IBM SPSS modeller. It is used for predicting the performance of secondary students based on 16 parameters that are related to their regular life. For executing the ANNQ3H model data set collected from 606 secondary education students in the form questionnaire, in India. This model showed good performance with better accuracy 93.39% when compared with other Data Mining (DM) classification techniques like LR (Logistic Regression), DT (Decision Tree) algorithms, Naïve Bayes, SVM (Support Vector Machine). Applications of DM are turning into a progressively basic apparatus in comprehension and taking care of instructive and authoritative issues in training. The discoveries of this article demonstrate the viability and importance of DM techniques in-subject assessment and advanced education mining. Besides, these discoveries might be utilized to increase the estimation instruments.In addition analysis of feature importance also shown for neural network classifiers it is used for evaluate the student performance.**

*Keywords*- **Artificial Neural Network; education data mining; Prediction; Decision Tree; SVM; ANNQ3H.**

## I. INTRODUCTION

Education is too valuable for all and it acts a crucial role in their lives we have different sectors in education like primary education which act as the beginning of education and secondary education which decides life dream finally higher education which achieves life dream. In this article focusing on secondary students' education, during the last decade's secondary education has improved in India. To improve the performance of secondary student academics with developing datasets can utilize DM (Data Mining) procedures it is utilized to locate the fascinating examples of enormous information which can be put away in DW (Data Warehouse) and Databases (Db) it is a procedure of execution of data and innovation DM is engaged with the combination of strategies, for example, perception, elite, database innovation, computing, AI, and so forth., The remainder of this article is composed as pursues: Section-2 explains about the data mining models of classification techniques and procedures utilized in this article. Section 3 contains about data set collection and details of parameters Section 4 presents the ANNQ3H model, and Section 5 tells about experiment results and discussion finally section 6 concludes the article

## II. LITERATURE REVIEW

University of Michigan state 2003 [1] web understudy GPA was modeled using 3 classification approaches (for example 2-classes: fail/pass, 3-classes: Low, Middle, High and 9-classes: from 1 - most minimal evaluation of 9 - most astounding score). The database contains 227 records with web parameters (for example the quantity of amended answers or goes after for schoolwork) the classifier model which obtained good accuracy (for example DT and ANN) accuracy scored 94% (paired), for 3 classes accuracy scored 72% and for 9 classes accuracy scored 62%. This is the difference that can find accuracy with several class labels. In another investigation,Kotsiantiset al.[2] to predicting the understudy performance of computer science from a college distance learning program many DM algorithms can use. For every understudy, many statistics (for example age, conjugal status, sex) and performance parameters (for example task grade) were utilized as contributions of a 2-classes fail/pass class. The Naïve Bayes classifier got the best result with an accuracy of 74%. Additionally, it was discovered that past school evaluations have a lot higher effect than statistic factors. In table 1 show about Literature of the type of education preferred with a count of parameters and class labels, accuracy scored, analysis and accuracy scored by an algorithm.

TABLE I: THE LITERATURE OF TYPE OF EDUCATION PREFERRED WITH A COUNT OF PARAMETERS AND CLASS LABELS, ACCURACY SCORED

| S. No | *Author* | *Type of Education preferred* | *Number of parameters with no of class labels and response values* | *Analysis and Accuracy* |
|---|---|---|---|---|
| 1 | Amin Zollanvari [3] | Higher Education | Data set=80, input fields=20 with 4 class labels | MWDT-82% |
| 2 | Mustafa Agaoglu [4] | Higher Education | data set=2850, input | C5.0-92.3% |

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# Intelligent Systems Design and Applications

## 18th International Conference on Intelligent Systems Design and Applications (ISDA 2018) held in Vellore, India, December 6-8, 2018, Volume 1


- Editors
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- Ajith Abraham
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## Table of contents

Page of 3
Next

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1. Intelligent Systems Design and Applications
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# About these proceedings

## Introduction

This book highlights recent research on Intelligent Systems and Nature Inspired Computing. It presents 212 selected papers from the 18th International Conference on Intelligent Systems Design and Applications (ISDA 2018) and the 10th World Congress on Nature and Biologically Inspired Computing (NaBIC), which was held at VIT University, India. ISDA-NaBIC 2018 was a premier conference in the field of Computational Intelligence and brought together researchers, engineers and practitioners whose work involved intelligent systems and their applications in industry and the “real world.” Including contributions by authors from over 40 countries, the book offers a valuable reference guide for all researchers, students and practitioners in the fields of Computer Science and Engineering.

## Keywords

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# Efficient Energy Attentive and Fault Recognition Mechanism in Distributed Wireless Sensor Networks: A Review

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**Abstract.** A recent modernization in wireless sensor networks (WSNs) has played a remarkable role to track and control the physical world. This technology is exhilarating with countless potential for many enormous applications like biomedical, industry, defence and so on. Despite of their benefits, design of energy attentive and fault recognition steering protocol is a key challenge. Plenty of research works has been proposed in past by many researchers based on multipath, query and location aware sensor network. However still there is a scope for enhancement in the performance of sensor network by finding efficient energy aware solution. Comprehensive analysis of existing methodologies in view of two challenges, energy management and fault recognition mechanism for scalable network is the main objective of this paper. This broad survey helps researchers to aware about technical concern and challenges in energy efficient fault recognition mechanism for WSNs.

**Keywords:** Wireless sensor network · Clustering · Energy efficiency · Fault tolerance · Load balance

## 1 Introduction

Advancement in the field of micro system has motivated the researchers to design smart wireless system which will monitor and run the physical world. From last few decades tremendous development has been done in sensor network. It is used for enormous application like defence, marine life monitoring, ecosystem monitoring, industrial sensing & diagnostics, disaster management and so forth. In catastrophic circumstances where human involvement is unsafe, wireless sensor network is able to run the target [1]. Implementation of real time application using sensor network is very popular because of their unique characteristics like self organized, self structure, flexible in nature etc. It is deploy randomly in hostile environment and difficult to replace. Advantages of wireless sensor network is seems to be more but it having least significant duo to their limitation like small batteries, limited storage space and less communication range, hence restricting the worldwide acceptance of sensor network. Energy management is a key challenge in WSNs [2]. The sensor battery can be charge by the solar energy, but it is not always possible and replacement of batteries is not the


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