HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST
HITECH

HINDUSTHAN INSTITUTE OF TECHNOLOGY

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Valley Campus, Pollachi Main Road, Coimbatore 641 032.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Innovations in Teaching Learning Process

Name of the Faculty	Dr. N.B. Mahesh Kumar
Subject code & Title	**20AD402 & Data Analytics**
Academic year & Semester	2023-2024 & V

1. Project-Based Learning (PBL):

Objectives:

- Students work on real-world projects that involve collecting, analyzing, and interpreting data. This hands-on approach enhances practical skills and problem-solving abilities.
- Mimics real-world scenarios, promotes teamwork, and provides a tangible outcome.
- Students have opportunities to develop skills of observation, survey, research, reporting, presentation, communication, and collaboration with people involved, team building, and leadership in problem-solving approach of project based learning.

Process flow in Project-Based Learning:

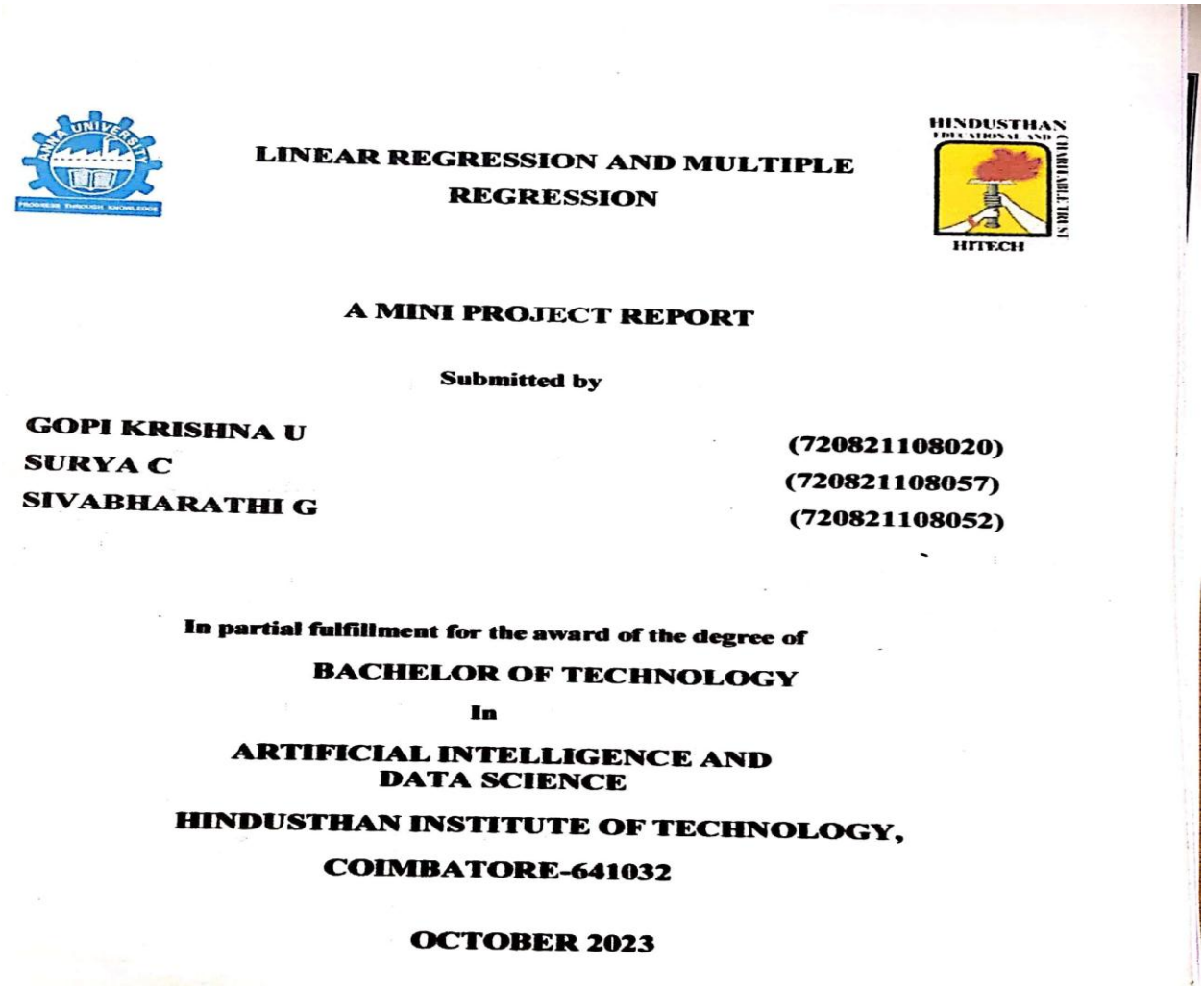
Students will define the learning objectives and standards that the project will address and determine the key knowledge, skills, and competencies students should acquire. Choose a meaningful, authentic, and relevant problem and ensure that the problem aligns with the learning objectives and encourages critical thinking. Form teams to encourage collaboration and teamwork. Assign specific roles within each team to distribute responsibilities. Students will conduct research to gather information related to the project. Students will explore multiple resources, including books, articles, interviews, and online sources. Students will design solutions, create prototypes, or develop models. Faculty members will monitor progress and provide guidance as needed. Have students present their projects to an audience, whether it's classmates, teachers, parents, or the community and emphasize effective communication skills. Faculty members will assess both the process and the final product and provide feedback based on established criteria and learning objectives.

Outcomes of the Project Based Learning:

- Through hands-on projects, students can develop a more profound understanding of the subject matter compared to traditional learning methods.
- Projects are designed to be challenging, requiring students to think critically and solve problems. This helps in developing essential skills that are applicable beyond the classroom.
- By working on projects, students are often encouraged to think creatively and come up with innovative solutions.
- Projects usually involve presentations, reports, or other forms of communication to share findings. This helps in improving students' communication skills, both in writing and verbally.

Mini Project Topic: Linear Regression and Multiple Regression

Samples:



LINEAR REGRESSION AND MULTIPLE REGRESSION

A MINI PROJECT REPORT

Submitted by

GOPI KRISHNA U (720821108020)
SURYA C (720821108057)
SIVABHARATHI G (720821108052)

In partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

In

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

HINDUSTHAN INSTITUTE OF TECHNOLOGY,

COIMBATORE-641032

OCTOBER 2023

INVESTIGATING THE IMPACT OF WEATHER CONDITIONS ON TOURIST ARRIVALS IN A SPECIFIC REGION

A MINI PROJECT REPORT

Submitted by

KUZHALVENDHAN M	**(720821108031)**
NOOR MOHAMED E	**(720821108042)**
SHREE VARSHA A N	**(720821108051)**
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May 2022

LINEAR REGRESSION AND MULTIPLE REGRESSION

A MINI PROJECT REPORT

Submitted by

1. **BENSTEIN SM (720821108011)**
2. **BHARANIRAJ K (720821108012)**
3. **KIRTHIKA R(720821108029)**
4. **SIVASAKTHI PANDIYAN P(720821108053)**
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COIMBATORE-641032

OCTOBER 2023

2. Case Studies:

Objectives:

- Analyzing real-world case studies and use cases helps students understand how data analytics is applied in various industries.
- Offers context to theoretical concepts, encourages critical thinking, and helps students see the relevance of analytics in different domains.

Process flow in Case Studies:

Students will able to identify a relevant and interesting case that aligns with the objectives of the Case study. Clearly articulate the problem or research questions that the case study aims to address. Conduct a literature review to understand existing research and theories related to the case. Identify gaps in knowledge that the case study could potentially fill. Gather relevant data from various sources. Use a combination of methods, such as interviews, surveys, observations, and document analysis. Formulate hypotheses or key areas of investigation. Determine the type of case study (exploratory, explanatory, descriptive, or intrinsic). Choose data collection methods (interviews, surveys, observations, document analysis). Organize and analyze the data using appropriate analytical tools. Interpret the results in the context of the research questions or problem statement. Summarize the key findings and conclusions. Structure the report with an introduction, background, methodology, findings, discussion, and conclusion.

Outcomes of the Case Studies:

- The case study may reveal specific problems, challenges, or issues within the subject under investigation.
- A case study provides a detailed and nuanced understanding of the case, offering insights into the complexities and intricacies of the situation.
- The case study might lead to the identification of best practices, lessons learned, or recommendations for individuals, organizations, or policymakers.
- The case study outcomes may demonstrate how theoretical concepts or frameworks can be applied in real-world situations, illustrating their practical relevance.
- If the case study was designed to test specific hypotheses, the outcomes will involve either the validation or refutation of these hypotheses based on the evidence collected.

Case Study Question 1:

"Is there a significant difference in the average salary between employees with a Bachelor's degree and employees with a Master's degree in a specific company?" In this case, you would collect salary data for two groups: employees with a Bachelor's degree and employees with a Master's degree. You could then perform a T-Test to determine if there is a statistically significant difference in their average salaries.

Case Study Question 2:

"Does a new drug result in a statistically significant decrease in blood pressure levels for patients with hypertension when compared to a placebo?" Here, you would collect blood pressure data for two groups: one receiving the new drug and the other receiving a placebo. By **conducting a T-Test**, you can assess whether the drug leads to a significant decrease in blood pressure levels.

Case Study Question 3:

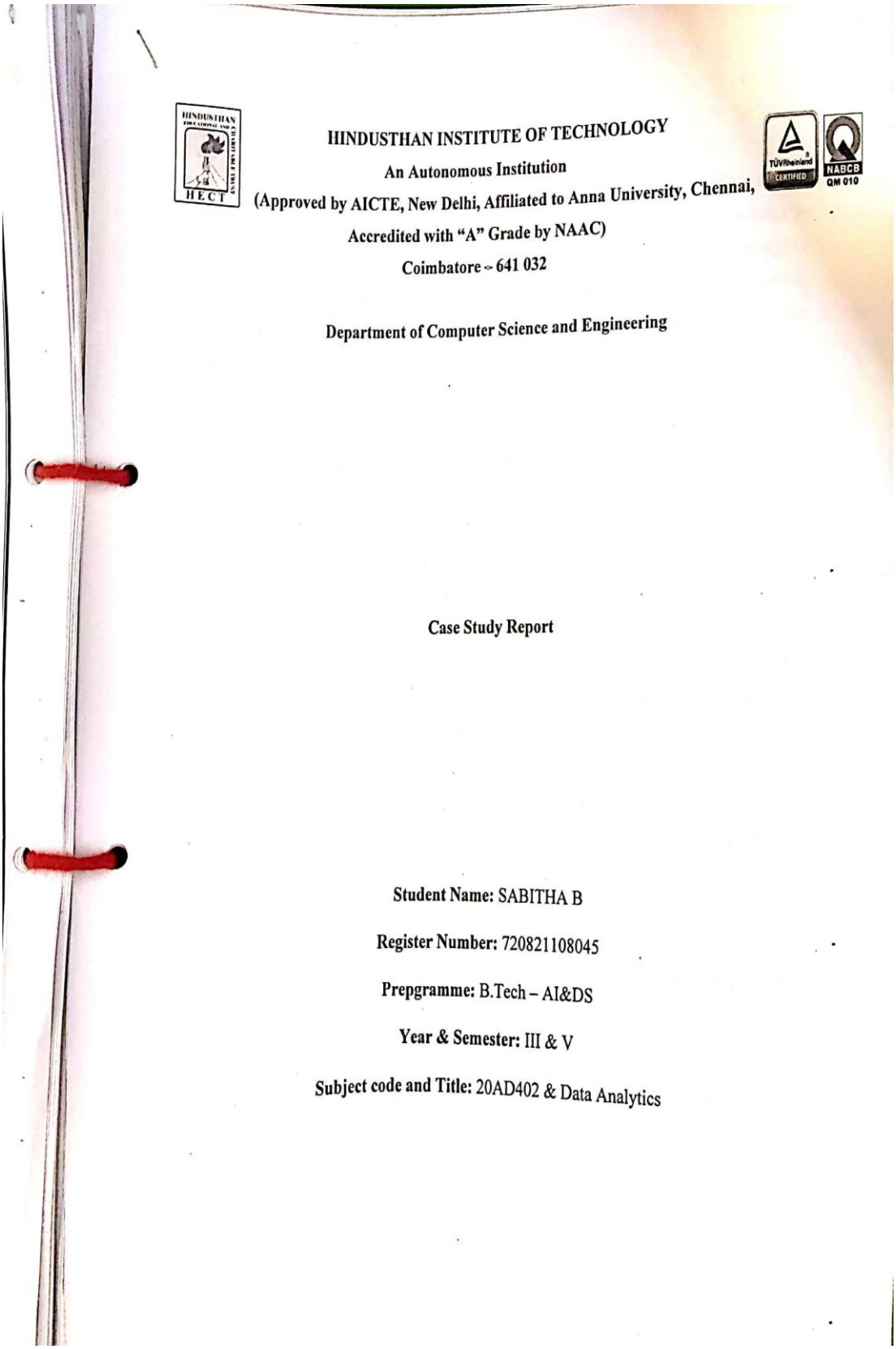
"Is there a significant difference in the mean response time between two different website designs?" For this question, you would measure response times for users interacting with two different website designs and use a **T-Test** to determine if one design is significantly faster or slower than the other.

Case Study Question 4:
"Do two different teaching methods lead to significantly different test scores in students?" In this case, you would compare the test scores of two groups of students who were taught using different methods. **A T-Test** would help you assess whether one teaching method is more effective in improving test scores.

Case Study Question 5:
Testing the Effectiveness of a Training Program
A company implements a training program to enhance the skills of its employees. The effectiveness of the training program is assessed by testing the performance of 30 employees before and after the training. A company implements a training program to enhance the skills of its employees. Perform Paired Sample T-Test on the two dependent samples.

Case Study Question 6:
Examining the Mean IQ Scores
A research study aims to assess whether the mean IQ score of a particular group of students differs significantly from the national average IQ score, which is 100. A sample of 50 students from this group has been randomly selected, and their IQ scores are recorded. Perform One Sample test used to determine whether the mean of a single sample differs significantly from a known or hypothesized population mean when the sample size is sufficiently large.

Samples:



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Coimbatore - 641 032

Department of Computer Science and Engineering

Case Study Report

Student Name: SABITHA B

Register Number: 720821108045

Prepgramme: B.Tech – AI&DS

Year & Semester: III & V

Subject code and Title: 20AD402 & Data Analytics

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Department of Computer Science and Engineering

Case Study Report

Student Name: AKILAN P

Register Number: 720821108002

Prepgramme: B.Tech – AI&DS

Year & Semester: III & V

Subject code and Title: 20AD402 & Data Analytics

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Name of the Faculty	Dr. N.B. Mahesh Kumar
Subject code & Title	**20CS502 & Soft Computing**
Academic year & Semester	2023-2024 & V

1. Interactive Simulations: (Virtual Lab)

Objectives:

- Use interactive simulations and demonstrations to help students visualize abstract concepts in soft computing.
- Simulate neural networks, genetic algorithms, and fuzzy logic systems to illustrate how these techniques work in different scenarios.

Process flow in Interactive Simulations:

Subject Faculty members identify the skills or knowledge the students should gain through the interactive experience. Assessment tools used to measure students' performance and understanding within the simulation. Design feedback mechanisms to guide the students. Gather feedback from students for continuous improvement in future iterations or versions.

Outcomes of the Interactive Simulations:

- Interactive simulations provide a hands-on, experiential learning environment that engages users actively.
- Students often retain information better when they actively participate in simulations compared to passive learning methods.
- Simulations can simplify complex concepts by breaking them down into interactive and manageable components.
- Simulations often present students with challenges and scenarios that require problem-solving and decision-making.

Virtual Lab Link: http://vlabs.iitkgp.ernet.in/scte/index.html

List of Experiments:

The experiments cover following broad areas:

1. Fuzzy Logic

- Fuzzy Logic Fundamentals and Basic Operations
- Fuzzy Inference System(FIS)
- Fuzzy Weighted Average
- Fuzzy Control

2. Artificial Neural Networks

- Neural Networks and Perceptron
- Multilayer Perceptron

3. Evolutionary Algorithms (EA)

- Introduction to EA
- Binary and Real Coded genetic Algorithms
- Genetic Expression Programming

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SOFT COMPUTING TOOLS IN ENGINEERING

Home > Soft Computing Tools in Engineering > Introduction to Fundamental of Fuzzy Logic and Basic Operations

Introduction to Fundamental of Fuzzy Logic and Basic Operations

INTRODUCTION THEORY PROCEDURE SIMULATOR QUIZ REFERENCE

Simulator

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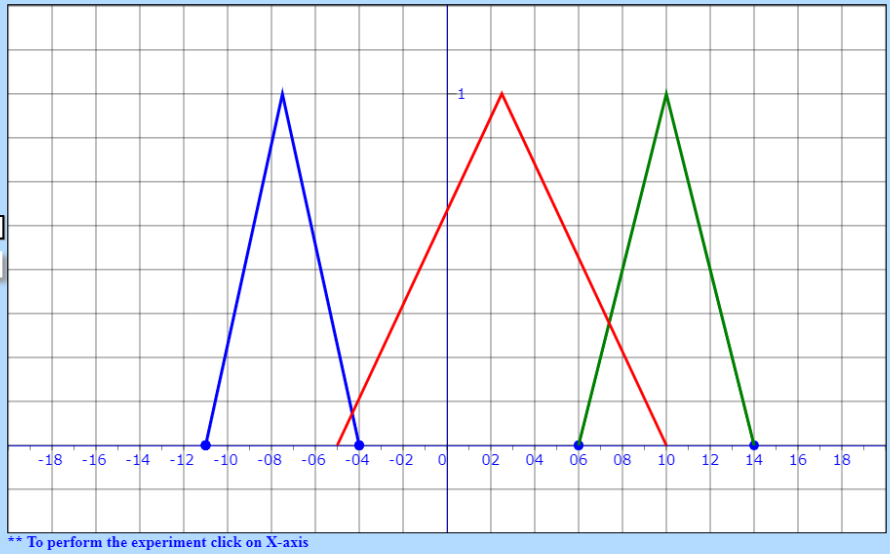
Introduction to Fundamental of Fuzzy Logic and Basic Operations Simulator

Plot

- Addition
- Substraction
- Complement
- Union
- Intersection

CALCULATE CLEAR

INSTRUCTION



** To perform the experiment click on X-axis

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SOFT COMPUTING TOOLS IN ENGINEERING

Home > Soft Computing Tools in Engineering > Fuzzy Inference System(FIS)

Fuzzy Inference System(FIS)

INTRODUCTION | THEORY | PROCEDURE | SIMULATOR | QUIZ | REFERENCE

Introduction

Fuzzy inference is the process of formulating the mapping from a given input to an output using fuzzy logic. The mapping then provides a basis from which decisions can be made, or patterns discerned. The process of fuzzy inference involves Membership Functions, Logical Operations, and If-Then Rules. You can implement two types of fuzzy inference systems in the toolbox: Mamdani-type and Sugeno-type. These two types of inference systems vary somewhat in the way outputs are determined.

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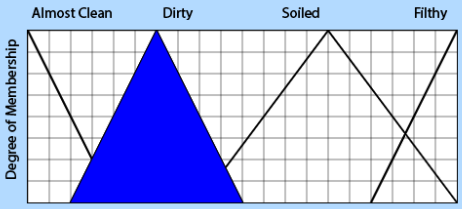
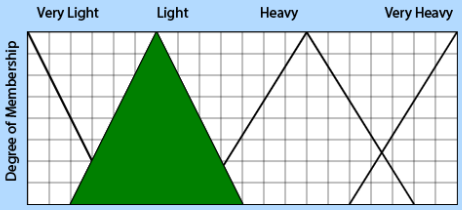
Fuzzy Inference Example

Select Dirtiness and Weight and click on the Result Button, Fuzzy Inference will Output the amount of Detergent Needed

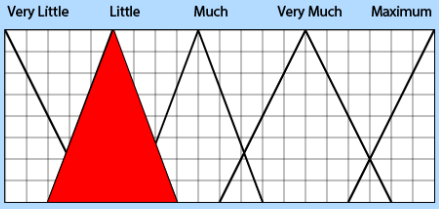


Dirtiness



Weight

RESULT | HOW | CLEAR



Fuzzy Inference Rules

If DIRTINESS is ALMOST_CLEAN and WEIGHT is VERY_LIGHT then DETERGENT is VERY_LITTLE
If DIRTINESS is ALMOST_CLEAN and WEIGHT is LIGHT then DETERGENT is LITTLE
If DIRTINESS is ALMOST_CLEAN and WEIGHT is HEAVY then DETERGENT is MUCH
If DIRTINESS is ALMOST_CLEAN and WEIGHT is VERY_HEAVY then DETERGENT is MUCH

If DIRTINESS is DIRTY and WEIGHT is VERY_LIGHT then DETERGENT is LITTLE
If DIRTINESS is DIRTY and WEIGHT is LIGHT then DETERGENT is LITTLE
If DIRTINESS is DIRTY and WEIGHT is HEAVY then DETERGENT is MUCH
If DIRTINESS is DIRTY and WEIGHT is VERY_HEAVY then DETERGENT is VERY_MUCH

If DIRTINESS is SOILED and WEIGHT is VERY_LIGHT then DETERGENT is MUCH
If DIRTINESS is SOILED and WEIGHT is LIGHT then DETERGENT is MUCH
If DIRTINESS is SOILED and WEIGHT is VERY_HEAVY then DETERGENT is VERY_MUCH
If DIRTINESS is SOILED and WEIGHT is VERY_HEAVY then DETERGENT is MAXIMUM

If DIRTINESS is FILTHY and WEIGHT is VERY_LIGHT then DETERGENT is VERY_MUCH
If DIRTINESS is FILTHY and WEIGHT is LIGHT then DETERGENT is MUCH
If DIRTINESS is FILTHY and WEIGHT is HEAVY then DETERGENT is VERY_MUCH
If DIRTINESS is FILTHY and WEIGHT is VERY_HEAVY then DETERGENT is MAXIMUM

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SOFT COMPUTING TOOLS IN ENGINEERING

Home > Soft Computing Tools in Engineering > Fuzzy Control and Application

Fuzzy Control and Application

INTRODUCTION THEORY PROCEDURE SIMULATOR QUIZ REFERENCE

Introduction

Fuzzy controllers are very simple conceptually. They consist of an input stage, a processing stage, and an output stage. The input stage maps sensor or other inputs, such as switches, thumbwheels, and so on, to the appropriate membership functions and truth values. The processing stage invokes each appropriate rule and generates a result for each, then combines the results of the rules. Finally, the output stage converts the combined result back into a specific control output value.

The most common shape of membership functions is triangular, although trapezoidal and bell curves are also used, but the shape is generally less important than the number of curves and their placement. From three to seven curves are generally appropriate to cover the required range of an input value, or the "universe of discourse" in fuzzy jargon.

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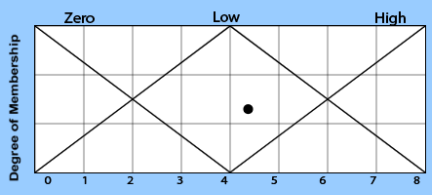
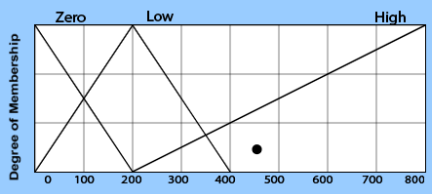
Fuzzy Control Example

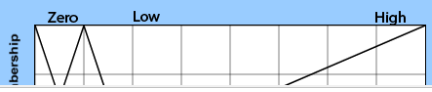
Select Pressure,Temperature and Flow rate and Click on Result Button,Fuzzy Control will Output the Mode(Pattern) of Operatio



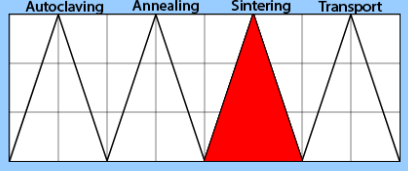
Pressure(kPa)

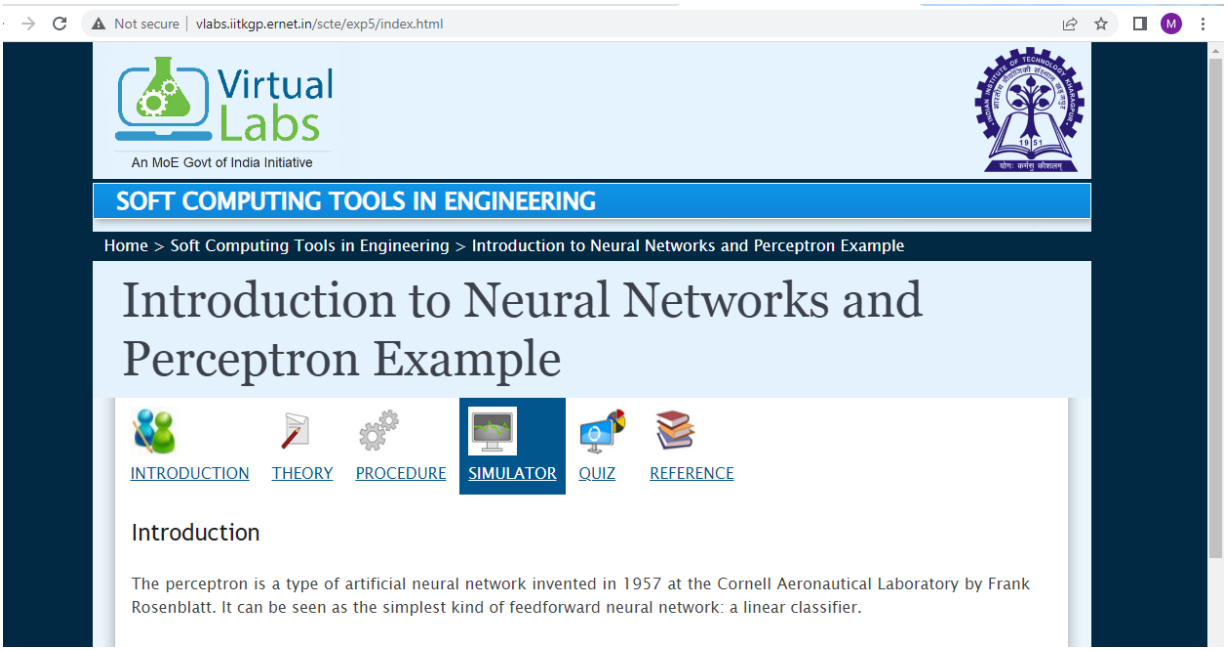


Temperature(C)



RESULT HOW CLEAR

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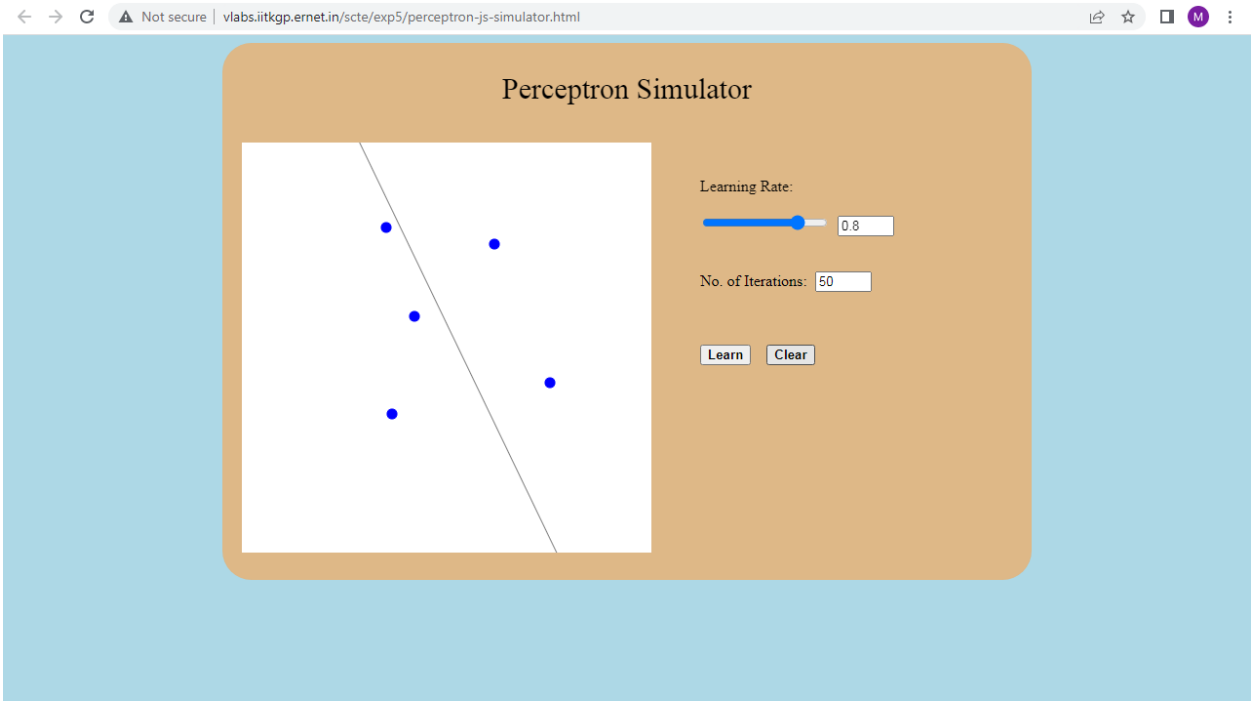
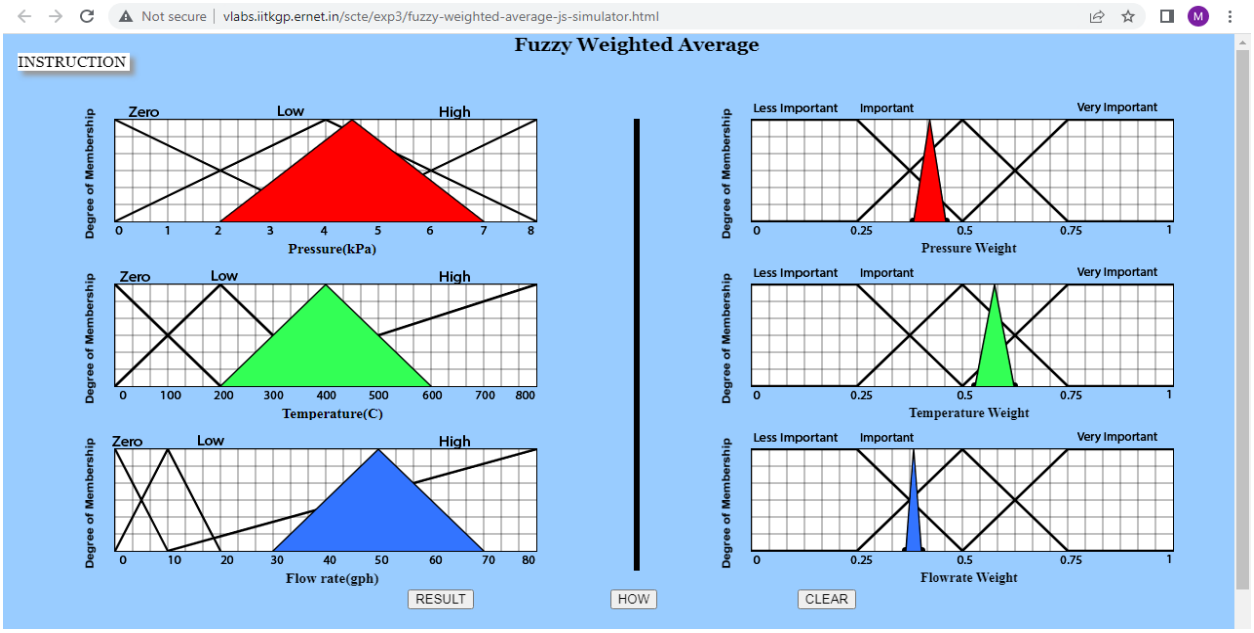
SOFT COMPUTING TOOLS IN ENGINEERING
Home > Soft Computing Tools in Engineering > Introduction to Neural Networks and Perceptron Example
Introduction to Neural Networks and Perceptron Example
INTRODUCTION
THEORY
PROCEDURE
SIMULATOR
QUIZ
REFERENCE
Introduction
The perceptron is a type of artificial neural network invented in 1957 at the Cornell Aeronautical Laboratory by Frank Rosenblatt. It can be seen as the simplest kind of feedforward neural network: a linear classifier.


Not secure | vlabs.iitkgp.ernet.in/scte/exp5/perceptron-js-simulator.html
Perceptron Simulator
Learning Rate:
0.8
No. of Iterations:
50
Learn
Clear



2. Online Platforms and Tools:

Objectives:

- Integrate online platforms and tools that allow students to experiment with soft computing algorithms in a user-friendly environment.
- Platforms like Jupyter Notebooks with Python libraries for machine learning and data analysis can be particularly useful.

Process Flow in Online Platforms and Tools:

Students typically start by creating an account on the platform. This involves providing necessary information such as username, email address, and password. After registration, students need to log in to the platform. This involves authentication using credentials provided during registration. Students may be prompted to set up their profiles by adding personal information, profile pictures, and any other relevant details. Once logged in, students navigate through the platform's interface to access features and tools. This may include a dashboard, menus, and other navigational elements. In collaborative platforms, students may work together on projects, documents, or other shared activities.

Outcomes of the Online Platforms and Tools:

- Online platforms facilitate communication and connection among individuals, allowing people to interact and collaborate regardless of geographical distances.
- Users gain access to a wealth of information through online platforms, whether it's news, educational resources, or industry-specific content.
- Collaboration tools enable teams to work together on projects in real-time, enhancing productivity and efficiency.
- Online platforms often serve as hubs for knowledge sharing, where users can contribute information, share experiences, and learn from one another.
- Many online platforms offer analytics tools, providing users with insights into user behavior, engagement metrics, and other data that can inform decision-making.

Questions:

1. Plotting various membership functions using python in Jupyter Notebooks platforms
2. Implementation of Fuzzy Inference System using python in Jupyter Notebooks platforms

3. Case Studies:

Objectives:

- Analyzing real-world case studies and use cases helps students understand how data analytics is applied in various industries.
- Offers context to theoretical concepts, encourages critical thinking, and helps students see the relevance of analytics in different domains.

Process flow in Case Studies:

Students will able to identify a relevant and interesting case that aligns with the objectives of the Case study. Clearly articulate the problem or research questions that the case study aims to address. Conduct a literature review to understand existing research and theories related to the case. Identify gaps in knowledge that the case study could potentially fill. Gather relevant data from various sources. Use a combination of methods, such as interviews, surveys, observations, and document analysis. Formulate hypotheses or key areas of investigation. Determine the type of case study (exploratory, explanatory, descriptive, or intrinsic). Choose data collection methods (interviews, surveys, observations, document analysis). Organize and analyze the data using appropriate analytical tools. Interpret the results in the context of the research questions or problem statement. Summarize the key findings and conclusions. Structure the report with an introduction, background, methodology, findings, discussion, and conclusion.

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Case Study Questions:

1. Case Study: Smart Traffic Signal Control

Consider a scenario in a busy urban area where traditional traffic signal control systems are causing congestion and delays. Design a fuzzy control system for smart traffic signal control to optimize traffic flow and reduce waiting times at intersections.

2. Case Study: A logistics company needs to optimize the location of its distribution centers to minimize transportation costs. The company operates in a region with multiple potential locations for new distribution centers. The objective is to find the optimal locations for these centers to reduce the overall transportation costs while considering existing facilities and customer demand. Apply Steepest-Ascent Hill Climbing for Facility Location Optimization.

Samples:

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Department of Computer Science and Engineering

Online Platform Tools and Case Study Report

Student Name: MARGREAT PAVITHRA. A

Register Number: 720821103065

Prepgramme: B.E. – CSE

Year & Semester: III & V

Subject Code and Name: 20CS502-Soft Computing

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Department of Computer Science and Engineering

Online Platform Tools and Case Study Report

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Year & Semester: III & V

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