CHRIST
COLLEGE (AUTONOMOUS)
IRINJALAKUDA, KERALA

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CRITERION	II	Teaching-Learning and Evaluation
KEY INDICATOR	2.3	**Teaching - Learning Process**
METRIC	2.3.1	**Student-centric methods such as experiential learning, participative learning and problem-solving methodologies are used for enhancing learning experiences:**

DEPARTMENT OF STATISTICS

Introduction

The Department of Statistics offers postgraduate programme in Statistics and complementary courses and open course in undergraduate level. The department was established in 2014 and keeps excellent track records in academic progression and placements since its inception.

Special features of the Department

- Elective courses on Statistical Machine Learning in Postgraduate Level
- Excellent campus placements in IT, Banking, Data Analysis Industries
- Certificate courses on R and Python programming
- Hands on practice sessions for postgraduate students' researchers of multidisciplinary subjects on R programming
- Undertake statistical analysis of Ph.D. and other research projects

	2.3.1(A) PARTICIPATIVE LEARNING	2.3.1(B) EXPERIENTIAL LEARNING	2.3.1(C) PROBLEM SOLVING
1	Industry visit -Billion bees International Private Limited, Irinjalakuda	R Programming a Beginners Perception	Dissertation/Project
2	Seminar Presentations	R Programming a Beginners Perception II	

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PARTICIPATIVE LEARNING

1. INDUSTRY VISIT -BILLION BEES INTERNATIONAL PRIVATE LIMITED, IRINJALAKUDA

We the students of MSc Statistics program along with our faculty reached Billion Bees International Private Limited by 1:30pm. We had two sessions in the two-and-a-half-hour program. The first session was about basics of trading, stocks and Forex it was conducted by Mr. Samson and the next session was about various AI developed charts of different stocks and bonds which was conducted by other instructor from Billion Bees. Mr. Samson was introduced for the session by Dr Davis Antony Mundassery Head of the Department of Statistics. Mr. Samson introduced us to the different types of trading concepts including trading of stocks, bonds and financial trading Forex (Foreign Exchange), different trading markets in Asia Bombay Stock Exchange (BSE)and National Stock Exchange (NSE) and their benchmark indices SENSEX and NIFTY. Trading is the process of generating income systematically continuously and legally. The session introduced us to concept of trading “buy low, sell high”. Mr. Samson also informed us the importance of having a passive income and how trading where there is no discrimination on basis of education, gender, nationality, can be used as part time or full-time job. This session also gave insights of how statistics is used in financial dataset in forecasting, prediction, understanding of trend, The law of large numbers followed in trading etc.

This introductory session was followed by a session on various AI developed charts which is an inventory venture of Billion Bees International Private Limited. This session was visual learning experience of how graphical representations are used to understand data, analyse result and help to predict future of data if the conditions prevail, all these are not only data driven but also the application of artificial intelligence the new era of scientific development. These graphical models made it easy for beginners like us to understand the basic concept and idea of trading. Overall, the session imparted a great experience of understanding how a financial

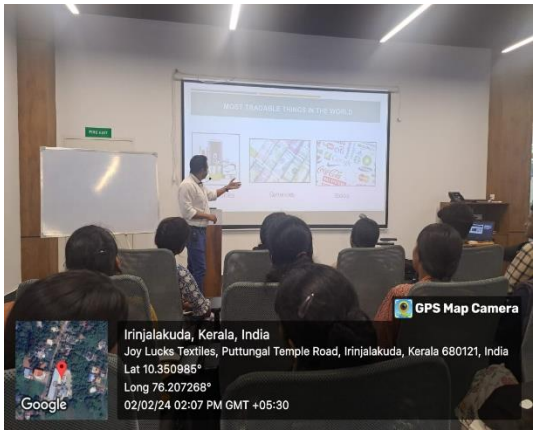
office works, to learn from experienced professionals and understand the basic of trading and its new age developments.

Billion Bees International Private limited is a private incorporated on 27 October 2022.It is classified as non-government company and is registered as Registrar of Companies, Ernakulam. Offering a wide range of financial instruments including stocks, bonds, options, futures and more giving clients the ability to diversify their portfolios and explore new investment opportunities. Director of Billion Bees International Private Limited are Babu Bibin and Jaitha Vijayan.

Programme Objectives:

- To introduce students to the emerging world of trading, stocks and markets
- To interact Students with industry personals and people handling financial data.
- To explore about financial data in trading, its possibilities in analysis and research.
- Understand applications of Statistics in Trading and other related financial data.

PHOTOS:



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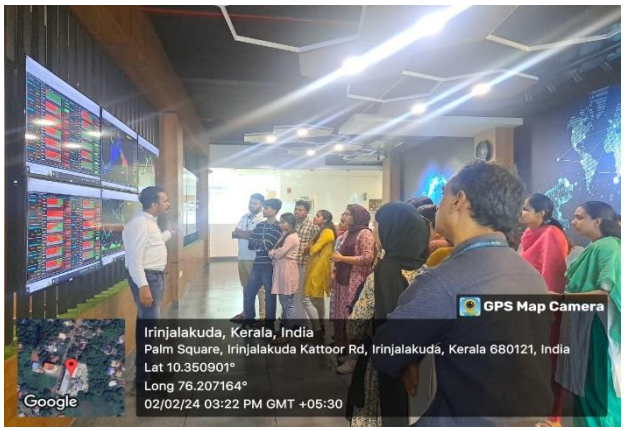

PARTICIPATION LIST:

Programme Attained Outcome :

- Introduction for beginners to experience working environment experience.
- Interaction with industry personals
- Understand trading, its concepts, different types of trading (stocks, currency trading etc.)
- Career opportunities in trading
- Application of statistics in trading sector, analysis of data ,predicting future of data.
- Recent developments in trading like AI generated models

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2. SEMINAR PRESENTATION

Machine Learning (ML) and Statistics are closely intertwined fields that often complement each other. Statistics provide the theoretical foundation for many machine learning algorithms, while machine learning techniques are increasingly being used to solve complex statistical problems. This seminar report explores the intersection of machine learning and statistics, focusing on how statistical principles underpin machine learning algorithms, the role of machine learning in modern statistical analysis, and applications in various domains.

Presentation Contents:

Machine Learning Algorithms with Statistical Foundations

Linear Regression

- **Description:** A basic and widely used statistical method for modeling the relationship between a dependent variable and one or more independent variables by fitting a linear equation to observed data.
- **Application:** Predicting continuous outcomes, such as house prices or sales forecasts.

Logistic Regression

- A regression analysis used for binary classification problems. It uses the logistic function to model the probability of a binary outcome.
- **Application:** Predicting binary outcomes, such as whether a customer will purchase a product or not.

Decision Trees and Random Forests

- **Description:** Decision trees use a tree-like model of decisions and their possible consequences. Random forests are an ensemble method that uses multiple decision trees to improve predictive performance.

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- **Application:** Classification and regression tasks, such as predicting customer churn or credit risk.

Bayesian Networks

- **Description:** Graphical models that represent the probabilistic relationships among a set of variables using Bayes' theorem.
- **Application:** Risk assessment, diagnostic systems, and prediction models.

Role of Machine Learning in Modern Statistical Analysis

- **Enhancing Predictive Accuracy**

  Machine learning algorithms, particularly ensemble methods and deep learning, often provide higher predictive accuracy compared to traditional statistical methods.

- **Handling High-Dimensional Data**

  Machine learning techniques such as Principal Component Analysis (PCA) and regularization methods help in reducing dimensionality and dealing with multicollinearity in high-dimensional data.

- **Automation of Model Selection**

  AutoML (Automated Machine Learning) frameworks facilitate the automatic selection of the best model and hyperparameters, making advanced statistical analysis accessible to non-experts.

- **Big Data Analysis**

  Machine learning algorithms are well-suited for analyzing large and complex datasets, providing insights that traditional statistical methods may not uncover due to computational limitations.

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Machine Learning Algorithms with Statistical Foundations

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Role of Machine Learning in Modern Statistical Analysis

Enhancing Predictive Accuracy

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Handling High-Dimensional Data

Machine learning techniques such as Principal Component Analysis (PCA) and regularization methods help in reducing dimensionality and dealing with multicollinearity in high-dimensional data.

Automation of Model Selection

AutoML (Automated Machine Learning) frameworks facilitate the automatic selection of the best model and hyperparameters, making advanced statistical analysis accessible to non-experts.

Big Data Analysis

Machine learning algorithms are well-suited for analyzing large and complex datasets, providing insights that traditional statistical methods may not uncover due to computational limitations.

Program Objectives:

- Exploring Machine Learning Algorithms with Statistical Foundations
- Discuss the Role of Machine Learning in Modern Statistical Analysis

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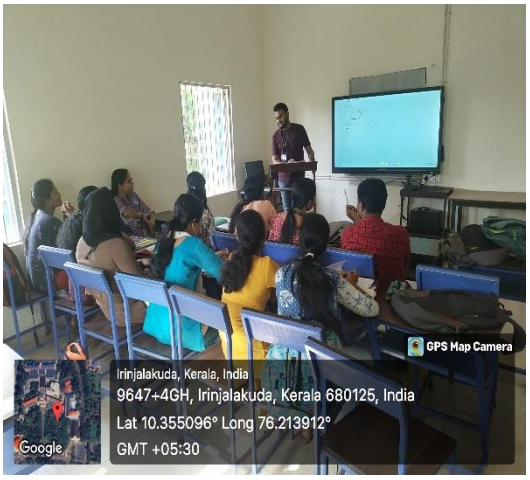

Program Outcome:

- Understand Machine Learning Algorithms with Statistical Foundations
- Realize the Role of Machine Learning in Modern Statistical Analysis

EXPERIENTIAL LEARNING

1. R PROGRAMMING A BEGINNERS PERCEPTION

The Statistics department of Christ College Autonomous, Irinjalakuda, conducted an introductory hands-on session to R programming for data analysis to the second year BSc Mathematics students of Christ College giving an insight to the application of tools like r programming in solving various basic mathematical operations, and how to apply these tools in data analysis and future under graduate project. The program was organized and conducted by the second year MSc Statistics students with help of slide shows, practice sessions. The program began with Dr Davis Antony Mundassery giving a brief knowledge on R programming and its applications. The session was

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hosted by Malavika P of second year Msc Statistics and covered topics like matrix operations (addition, subtraction,matrix multiplication, inverse) ,solving system of linear equations , data extraction from R library, visualizations of data using histogram, pie chart, bar chart,boxplot,scatter plot. The session being hands-on created an opportunity for students to understand syntax and errors on running them. The students of M.Sc. Statistics assisted them I rectifying the errors on spot. The session lasted for one and half hours.

OBJECTIVES:

- To give a basic introduction to R programming language
- To understand the capacity of the program in solving various time-consuming mathematical calculations like inverse calculation, matrix operations etc
- To demonstrate the data visualization techniques like pie plot, bar chart, bar plot etc. for data analysis.
- To understand the application of R programming in data analysis like hypothesis testing.
- To develop interest in students on data analysis by R programming

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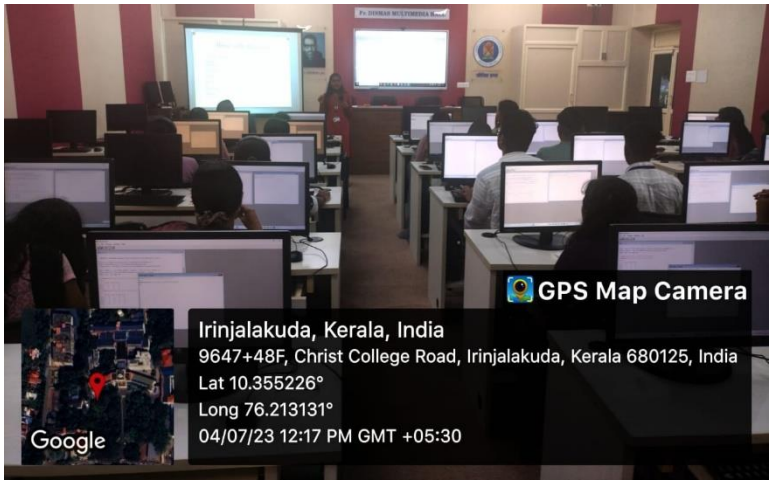

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OUTCOME ATTAINED:

- Introduction for beginners to the experience of data analysis using R program
- Understanding of application of programming tools in solving mathematical problems.
- Understanding of various data visualization techniques in R program.
- Knowledge on various basic statistical tests in testing of hypothesis.

2. R PROGRAMMING A BEGINNERS PERCEPTION II

The Statistics department of Christ College Autonomous, Irinjalakuda, conducted an introductory hands-on session to R programming for data analysis to the third year BSc Mathematics students of Christ College giving an insight to the application of tools like r programming in solving various basic mathematical operations, and how to apply these tools in data analysis and future under graduate project. The program was organized and conducted by the second year MSc Statistics students with help of slide shows , practice sessions. The program began with Dr Davis Antony Mundassery giving a brief knowledge on R programming and its applications.The session was hosted by Malavika P of second year Msc Statistics and covered topics like matrix operations (addition,subtraction,matrix multiplication,inverse) ,solving system of linear equations , data extraction from R library, visualtions of data using histogram,pie chart,bar chart,boxplot,scatter plot. The session being hands-on created an opportunity for students to understand syntax and errors on running them.The students of Msc Statistics assisted them I rectifying the errors on spot. The session lasted for one and half hours.

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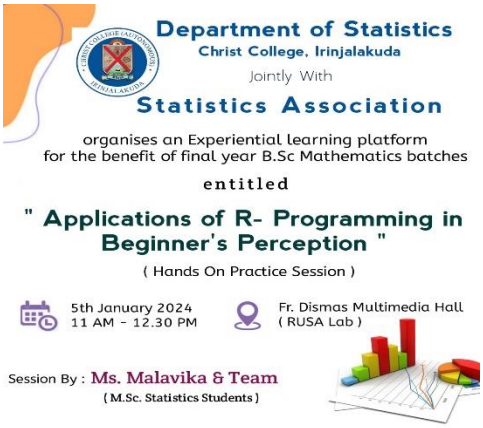
Brochure:



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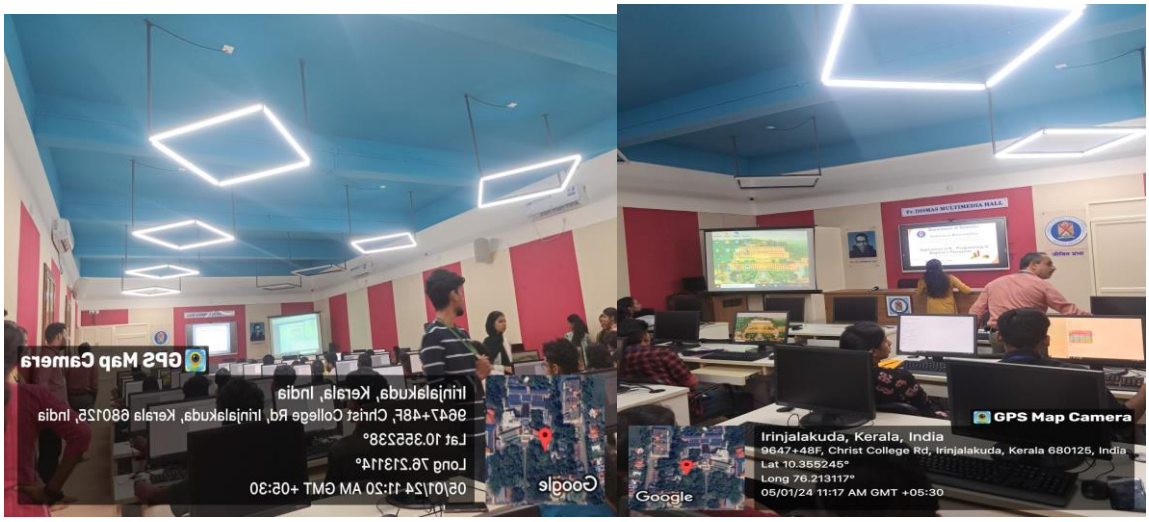

OUTCOME ATTAINED:

- Introduction for beginners to the experience of data analysis using R program
- Understanding of application of programming tools in solving mathematical problems.
- Understanding of various data visualization techniques in R program.
- Knowledge on various basic statistical tests in testing of hypothesis.

PROBLEM SOLVING

1. DISSERTATION/PROJECT

The M.Sc in Statistics program equips students with advanced knowledge and skills in statistical theory, methodologies, and applications. A significant component of the program involves undertaking research projects that allow students to apply statistical techniques to real-world problems, explore theoretical concepts, and contribute to the field's advancement. This report provides an overview of the

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common types of projects undertaken by M.Sc Statistics students, highlighting their objectives, methodologies, and contributions.

Program Objectives/Expected outcomes:

- Data Analysis and Modeling
- Experimental Design and Analysis
- Survey Research and Sampling Techniques
- Machine Learning and Data Mining
- ***List of Students***

Sl.No	Name	Project Topics
1	Aiswarya P S	Breast Cancer Prediction using Machine Learning
2	Alwin. P. P	A Study on Indian and Global Stock Market
3	Arifa A S	Odd Frèchet -G family distinctions with 3-parameter Frèchet distribution
4	Malavika P	An Introduction to E Values and Its Significance
5	Namrutha T U	Birch Clustring
6	Parvathy Gopalakrishnan	Markov chain Monte Carlo method
7	Pranav A P	Gold Price Prediction Using Random Forest Regression
8	Riyan Mohammad	A Study on Nifty50 Indices of National Stock Exchange
9	Rosmiya Joseph	Forecasting of Coffee Production in India
10	Samia A A	Thyroid disorder classification in women with abnormal uterine bleeding

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11	Selin Stelvia Rodrigues	A study about Kumaraswamy Distribution
12	Vishnupriya V	A Statistical Study on Wheat Production in India

Recommendations for Future Research:

- Explore emerging areas such as Bayesian statistics, big data analytics, and spatial statistics.
- Investigate interdisciplinary applications of statistics in fields like bioinformatics, finance, and environmental science.
- Foster collaboration between statisticians and domain experts to tackle complex societal challenges.

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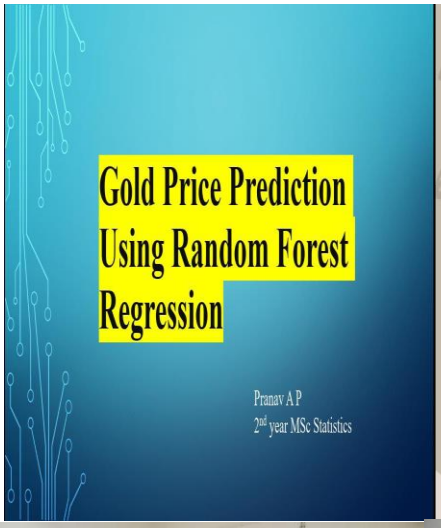
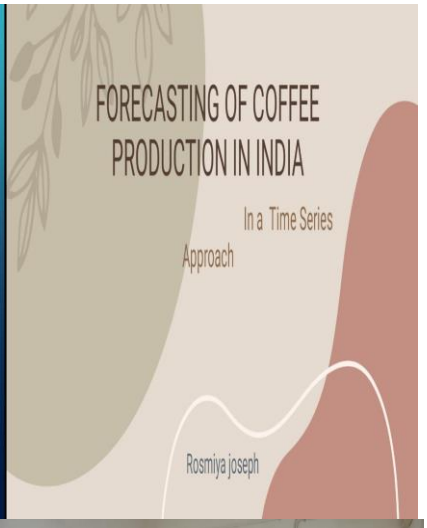
Geo Tagged Photos





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Outcomes:

The projects undertaken in M.Sc Statistics programs are diverse, covering a wide range of statistical methods and applications. These projects not only deepen students' understanding of statistical theory but also prepare them to address complex real-world problems using data-driven approaches. By conducting these projects, students contribute to the advancement of statistical knowledge and its practical applications across various fields

PRINCIPAL

Fr. Dr. Jolly Andrews
Associate Professor -
In-Charge of Principal
Christ College (Autonomous)
Irinjalakuda