

A Long Internship/Course Report on

“IIT HYDERABAD TIHAN AIML 6-MONTHS COURSE”

Submitted in partial fulfillment of the degree

Bachelor of Technology
in
Electronics and Communication Engineering

submitted by

Kanithi Sowmya – RO200644

Under the supervision of
Mr.China Babu V



RGUKT Ongole Campus

Department of Electronics and Communication Engineering

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES – ONGOLE

Prakasam District, Andhra Pradesh

AY 2025- 2026

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Student ID : TiHAN_AIMLD_25071368

Student Name : Sowmya Kanithi

Course Start Date : 21 Jul 2025

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A handwritten signature in black ink that reads 'Keshav Mishra'.

-Program Head

APPROVAL SHEET

This project report entitled “**IIT HYDERABAD TIHAN AIML 6-MONTHS COURSE**” being submitted by **Kanithi Sowmya** (RO200644) is approved for the degree of Bachelor of Technology in Electronics and Communication Engineering.

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Place of Submission: _____

Mr. M. Vijaya Bhaskar
Head of Department, Department of ECE
RGUKT-Ongole

Stamp of the Department

CANDIDATE'S DECLARATION

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included. I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission had not been taken when needed.

Kanithi Sowmya (RO200644)

Date:

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES – ONGOLE CAMPUS



CERTIFICATE

This is to certify that “Summer Internship report” entitled “**AgriPredict Crop Recommendation System**” being submitted by **Kanithi Sowmya** (RO200644) to the department of Electronics and Communication Engineering, Rajiv Gandhi University of Knowledge Technologies, Ongole Campus during the academic year 2025-2026 is a partial fulfilment for the award of the under graduate degree Bachelor Of Technology in Electronics and Communication Engineering, is a Bonafide record carried out by her under the supervision of Talent Trek e-learning Pvt Ltd. The report has fulfilled all the requirements as per as regulations of this institute and in my opinion reached the standard for submission.

Date:

Place: Ongole

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Kanithi Sowmya – RO200644

ABSTRACT

This report provides a detailed account of my ongoing engagement in the AI and Machine Learning certification program conducted by TiHAN at IIT Hyderabad, undertaken with formal approval from the Head of Department as a replacement for the long-term internship requirement. Currently in the fourth month of the program, I have been exposed to a comprehensive curriculum covering foundational to intermediate-level concepts in Artificial Intelligence and Machine Learning. The coursework includes data preprocessing techniques, exploratory data analysis, supervised and unsupervised learning algorithms, model training and evaluation strategies, and introductory components of deep learning and neural networks.

The course follows a structured blend of theoretical lectures, hands-on lab sessions, coding assignments, quizzes, and project-oriented tasks that encourage practical implementation of the concepts learned. Regular interaction with instructors and mentors has enhanced my understanding of real-world AI/ML problem-solving approaches, computational tools, and best practices in model development.

This report highlights the modules completed so far, the technical skills acquired, and the practical work undertaken during the first four months. Although the course is still in progress, the learning experience has significantly strengthened my analytical thinking, programming proficiency, and familiarity with modern machine learning workflows. The ongoing training continues to contribute meaningfully to my academic development and prepares me for advanced topics and future professional opportunities in the AI/ML domain.

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CHAPTER 1

INTRODUCTION TO THE TIHAN AI ML PROGRAM

1.1 Introduction

The TiHAN AI/ML Program offered by IIT Hyderabad is a specialized training initiative designed to equip learners with strong foundational and practical skills in the rapidly growing fields of Artificial Intelligence and Machine Learning. TiHAN (Technology Innovation Hub on Autonomous Navigation and Data Acquisition Systems) is one of the prestigious innovation hubs established under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), Government of India. With its focus on advanced technologies such as autonomous systems, intelligent data processing, and AI-driven solutions, TiHAN has emerged as a leading center for research, innovation, and skill development in India.

The AI/ML program is structured to bridge the gap between theoretical understanding and real-world application. It is aimed at students, researchers, and professionals who aspire to gain hands-on experience in AI and machine learning techniques used across industries today. The program emphasizes a learner-centric approach that integrates conceptual learning with practical experiments, coding assignments, and guided projects. Participants are introduced to the essential mathematical and computational foundations of AI, including statistics, linear algebra, probability, and Python programming. These fundamentals create a strong base for exploring machine learning algorithms and developing intelligent models.

One of the major strengths of the TiHAN AI/ML Program is its curriculum, which is designed and delivered by experienced faculty members and researchers from IIT Hyderabad and domain experts from industry. The program offers an in-depth understanding of supervised learning, unsupervised learning, data preprocessing, model evaluation, and an introduction to deep learning. Each module is accompanied by live demonstrations, hands-on coding sessions, and case studies that help learners connect theory with practical implementation. The structured flow of the course ensures continuous progress, allowing learners to gradually advance from basic concepts to more complex AI models and techniques.

The program also emphasizes problem-solving abilities and encourages participants to apply machine learning methods to real-life datasets. This approach not only strengthens technical skills but also enhances analytical thinking, logical reasoning, and the ability to approach problems from a data-driven perspective. Regular assessments, quizzes, and mentor support further ensure that learners stay on track and develop confidence in applying AI/ML tools effectively.

Overall, the TiHAN AI/ML Program serves as a valuable platform for gaining industry-relevant AI knowledge and strengthening technical competencies. Its combination of expert instruction, practical exposure, and interdisciplinary learning makes it a highly beneficial opportunity for students preparing for careers in AI, data science, automation, and related technology domains. As an approved substitute for the traditional internship, the program provides a strong academic and professional foundation, helping learners stay aligned with modern technological advancements and future-oriented skill requirements.

CHAPTER 2

OBJECTIVE OF ENROLLING IN THE COURSE

The decision to enroll in the TiHAN AI/ML Program at IIT Hyderabad was driven by the growing relevance and demand for Artificial Intelligence and Machine Learning in today's technological landscape. As industries rapidly adopt data-driven solutions, intelligent automation, and AI-based decision-making systems, developing competency in these domains has become essential for students and professionals alike. The primary objective behind choosing this course was to acquire strong foundational knowledge and practical skills in AI/ML that are aligned with current industry standards and future technological trends.

Another significant reason for enrolling in this course was the opportunity to receive training from a premier institution like IIT Hyderabad, renowned for its advanced research facilities, expert faculty, and innovation-focused curriculum. The TiHAN program, being a part of the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), offers structured, high-quality learning modules designed to equip participants with technical depth and hands-on expertise. Choosing this program allows me to learn directly from domain specialists, gain exposure to real-world applications, and understand cutting-edge developments in AI, machine learning, and autonomous systems.

Replacing the traditional long-term internship with this certified AI/ML course was a strategic academic decision aimed at enhancing technical proficiency rather than engaging in conventional internship tasks that may or may not align with my career goals. The course offers a more focused, comprehensive, and skill-driven learning environment where each module is carefully designed to build competencies step by step. The objective behind this choice was to invest in a learning experience that provides tangible outcomes, such as improved coding ability, stronger analytical thinking, and practical understanding of machine learning algorithms.

A key goal of enrolling in this program is to become proficient in essential AI/ML tools, libraries, and techniques, including Python programming, data preprocessing, supervised and unsupervised learning, model evaluation, and an introduction to deep learning. By gaining these skills, I aim to prepare myself for future academic projects, research opportunities, and career pathways in AI, data science, or related fields. The course also helps in developing problem-solving skills by exposing learners to real datasets and practical machine learning challenges, which strengthens both technical and logical reasoning abilities.

Furthermore, the course serves as a foundation for future specialization. As AI and ML continue to expand into areas such as natural language processing, computer vision, robotics, and autonomous systems, having a strong foundational understanding becomes crucial for advanced learning. Enrolling in this course is therefore a long-term investment in continuous skill development and lifelong learning.

In summary, the objective of enrolling in the TiHAN AI/ML Program is to gain structured technical knowledge, build industry-relevant skills, enhance academic growth, and prepare for future opportunities in the rapidly evolving field of Artificial Intelligence.

CHAPTER 3

COURSE STRUCTURE AND OVERVIEW

The TiHAN AI/ML Program offered by IIT Hyderabad is designed as a comprehensive and structured learning pathway that covers both fundamental and advanced concepts in Artificial Intelligence and Machine Learning. The curriculum follows a progressive approach, allowing learners to gradually build their knowledge from basic principles to complex algorithmic techniques. The course is divided into multiple modules, each focusing on a specific area of AI/ML, and is delivered through a balanced combination of lectures, hands-on sessions, assignments, and assessments.

At the foundation level, the program begins with an introduction to Python programming, data handling, and essential mathematical concepts such as statistics, linear algebra, and probability. These core areas form the backbone of machine learning and are essential for understanding algorithm behavior and data-driven decision-making. Learners are trained in using Python libraries like NumPy, Pandas, Matplotlib, and Scikit-learn, which are widely used for data analysis and model development. The focus during this phase is to ensure that students develop a strong technical base to support further learning.

As the course progresses, the curriculum transitions into supervised machine learning techniques. This includes algorithms such as linear regression, logistic regression, decision trees, random forests, support vector machines, and ensemble methods. Each algorithm is explained through real-world examples, coding demonstrations, and practical exercises that allow learners to understand how models are trained, evaluated, and optimized. Concepts like bias–variance tradeoff, overfitting, feature engineering, and hyperparameter tuning are also introduced at this stage to strengthen the students’ understanding of effective model building.

The next part of the curriculum explores unsupervised learning techniques, including clustering methods like K-means, hierarchical clustering, and dimensionality reduction techniques such as PCA. These modules help learners understand how to discover patterns, group data, and extract meaningful insights from unlabeled datasets. Practical applications in fields such as customer segmentation, anomaly detection, and pattern recognition are also highlighted.

As an advanced component, the program introduces the basics of deep learning and neural networks. Learners gain exposure to perceptrons, activation functions, gradient descent, and neural network training workflows. This module lays the groundwork for more advanced AI domains such as computer vision and natural language processing, which many students choose to explore later in their academic or professional journey.

Throughout the course, the structure emphasizes continuous assessment through quizzes, coding tasks, hands-on lab sessions, and mini-projects. These activities are designed to reinforce learning and ensure that participants can apply theoretical knowledge to practical AI/ML problems. Regular mentor support, peer discussions, and interactive sessions enhance the collaborative learning experience.

CHAPTER 4

MODULES COVERED

The first four months of the TiHAN AI/ML Program at IIT Hyderabad consist of a well-designed sequence of modules that gradually introduce learners to the essential components of Artificial Intelligence and Machine Learning. Each module is structured to build conceptual knowledge, improve coding abilities, and develop practical skills through hands-on exercises. The modules covered so far form the core foundation required to understand and implement AI/ML techniques in real-world scenarios.

1. Introduction to Python Programming and Data Handling

The initial module focuses on building proficiency in Python, the most widely used programming language in the field of AI and machine learning. During this phase, learners are introduced to Python syntax, data types, control structures, functions, file handling, and interactive programming practices. Special attention is given to the use of Jupyter Notebook, which serves as the primary environment for coding and experimentation.

The module also covers essential Python libraries such as NumPy for numerical computations, Pandas for data manipulation, and Matplotlib/Seaborn for data visualization. Learners gain experience in loading datasets, cleaning data, performing exploratory analysis, and generating visual insights. This foundational module ensures that participants are comfortable with coding workflows before progressing to machine learning concepts.

2. Mathematical and Statistical Foundations for Machine Learning

A strong mathematical base is crucial for understanding machine learning algorithms. The second module emphasizes the core mathematical concepts required for AI/ML, including linear algebra, probability theory, and statistics. Learners are taught vector operations, matrices, eigenvalues, eigenvectors, and their applications in model building. Probability distributions, sampling techniques, hypothesis testing, and descriptive statistics are also covered to support data-driven reasoning.

This module strengthens analytical thinking by helping learners understand how algorithms interpret data, optimize parameters, and make predictions. Mathematical intuition gained here becomes essential when evaluating model performance and diagnosing issues such as overfitting or bias.

3. Data Preprocessing and Exploratory Data Analysis (EDA)

The third module introduces students to the importance of preparing data before model development. Topics such as missing value handling, outlier detection, data normalization, train-test splitting, and

feature encoding are covered in detail. Learners explore various techniques to transform raw data into a usable format that enhances model accuracy and efficiency.

Exploratory Data Analysis (EDA) forms a major part of this module, teaching learners how to uncover hidden patterns, identify correlations, and understand dataset characteristics. Using libraries like Pandas, Seaborn, and Matplotlib, participants create visualizations including histograms, scatter plots, heatmaps, and boxplots. This module plays a critical role in building the habit of analyzing data thoroughly before applying machine learning methods.

4. Supervised Machine Learning Algorithms

One of the most important modules in the first four months covers supervised learning, where models are trained using labeled datasets. The module begins with regression techniques such as Linear Regression and Polynomial Regression, focusing on how models predict continuous outcomes. Concepts such as cost functions, gradient descent, and performance metrics like Mean Squared Error (MSE) and R^2 Score are introduced.

Next, learners explore classification algorithms including Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees, Random Forests, Naive Bayes, and Support Vector Machines (SVM). Each algorithm is explained through both theoretical understanding and practical implementation using Scikit-learn. The module also teaches model evaluation techniques such as confusion matrices, accuracy, precision, recall, F1-score, ROC curves, and cross-validation. This module enables learners to build, test, and refine predictive models effectively.

5. Unsupervised Machine Learning Techniques

The next module introduces unsupervised learning, which deals with unlabeled data and pattern discovery. Learners study clustering techniques such as K-Means Clustering and Hierarchical Clustering. Practical exercises include grouping customers, detecting anomalies, and identifying patterns in datasets without predefined labels.

Dimensionality reduction concepts, especially Principal Component Analysis (PCA), are also covered. PCA helps in reducing the number of features while preserving essential information, which is vital for handling high-dimensional datasets. Through hands-on activities, participants learn how unsupervised learning is applied in fields such as recommendation systems, market segmentation, and anomaly detection.

6. Mini-Assignments, Assessments, and Practical Exercises

Throughout the four months, each module is reinforced with assignments, quizzes, coding tasks, and practical challenges. These continuous assessments help learners implement the concepts they learn and improve their problem-solving abilities. Real-life datasets are used to simulate industry scenarios, giving participants a realistic understanding of how AI/ML techniques are applied in practice.

CHAPTER 5

SKILLS AND COMPETENCIES ACQUIRED

The first four months of the TiHAN AI/ML Program at IIT Hyderabad have provided a structured platform to acquire a wide range of technical and analytical skills essential for working in the field of Artificial Intelligence and Machine Learning. These competencies extend beyond theoretical knowledge, emphasizing hands-on implementation, problem-solving, and the ability to work with real-world datasets.

1. Programming and Technical Skills

One of the primary skills developed during the course is proficiency in Python programming, which serves as the backbone for most AI/ML projects. Through hands-on exercises, I have become comfortable with Python syntax, data structures, functions, and libraries such as NumPy, Pandas, Matplotlib, Seaborn, and Scikit-learn. These tools have enabled me to efficiently perform data preprocessing, analysis, visualization, and model development. Exposure to frameworks like TensorFlow and Keras in introductory deep learning sessions has also familiarized me with neural network implementation.

2. Data Handling and Preprocessing

Another key competency is the ability to handle and preprocess raw datasets. I have learned to identify missing values, detect outliers, normalize and standardize data, encode categorical variables, and perform train-test splits. Additionally, I am skilled in performing Exploratory Data Analysis (EDA) to identify patterns, trends, and correlations in data, which is critical for effective model building. These skills ensure that I can prepare real-world datasets for machine learning tasks with accuracy and efficiency.

3. Machine Learning Model Development

The program has provided hands-on experience in building supervised and unsupervised machine learning models. I have gained the ability to implement regression models (linear and logistic), classification models (decision trees, random forests, SVMs, KNN), clustering techniques (K-Means, hierarchical clustering), and dimensionality reduction methods (PCA). I have also learned to evaluate model performance using metrics such as accuracy, precision, recall, F1-score, and ROC curves, enabling me to choose and optimize models effectively.

4. Analytical and Problem-Solving Skills

Through continuous coding exercises and mini-projects, I have strengthened my analytical thinking and problem-solving skills. I can now approach datasets critically, identify patterns, and apply appropriate algorithms to solve specific problems.

CHAPTER 6

CONCLUSION AND FUTURE LEARNING PLAN

The ongoing TiHAN AI/ML Program at IIT Hyderabad has been a transformative learning experience, providing a structured and practical understanding of Artificial Intelligence and Machine Learning. Through the first four months, I have developed a strong foundation in Python programming, data handling, exploratory data analysis, and machine learning model development. The combination of theoretical instruction, hands-on coding exercises, and mini-projects has strengthened my analytical thinking, problem-solving abilities, and application-oriented skills.

Although the program is still in progress, the knowledge and competencies gained so far have already proven valuable in bridging the gap between academic learning and real-world AI/ML applications. By working with diverse datasets, implementing both supervised and unsupervised algorithms, and gaining an introductory understanding of deep learning, I have built confidence in approaching complex data-driven problems and applying appropriate solutions.

Looking ahead, the future learning plan focuses on deepening my expertise in advanced machine learning and AI domains. This includes exploring areas such as neural networks, deep learning architectures (CNNs, RNNs), natural language processing, reinforcement learning, and real-world AI applications. I also plan to undertake more comprehensive projects that integrate multiple AI/ML techniques to solve complex problems, thereby further enhancing practical experience. Additionally, I aim to stay updated with emerging tools, libraries, and industry trends to ensure that my skills remain relevant and competitive.

In conclusion, enrolling in the TiHAN AI/ML Program as a substitute for the traditional long-term internship has been a strategic and rewarding decision. The program not only fulfills the academic requirement but also lays a strong foundation for advanced studies, research, and professional growth in the rapidly evolving field of Artificial Intelligence and Machine Learning. Continued engagement with the program will equip me with the skills and knowledge necessary to contribute effectively to future technological advancements and industry challenges.