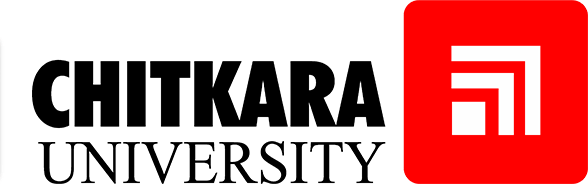
**Artificial Intelligence and Machine Learning**

Project Report Semester-IV (Batch-2022)

Human Activity Recognition using Smartphone Dataset

ML project



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**ABSTRACT**

Artificial Intelligence and Machine Learning (AIML) techniques are integrated and play a key role in this Human Activity Recognition (HAR) project based on smartphone data. The main goal is to create a reliable and precise model that, using information gathered from smartphone sensors like accelerometers and gyroscopes, can identify a wide range of human activities. The project aims to go beyond conventional rule-based systems by integrating AIML algorithms, allowing the model to independently learn complex patterns and nuances related to various activities.

The dataset used in this study has been carefully selected to cover a broad range of scenarios, guaranteeing the adaptability and generalizability of the model in diverse user contexts. By utilizing AIML capabilities, the system investigates other machine learning models or sophisticated neural networks, promoting ongoing improvement and modification. Optimizing the extraction of pertinent information from sensor data to feed into AIML models is a major focus of feature engineering. The system is able to learn and identify new activities or variations on preexisting ones thanks to this iterative process, which also improves activity recognition accuracy.

The project intends to go beyond simple classification and explore real-time recognition, building a system that can dynamically adjust to users' actions. In addition to improving activity recognition technology, the combination of AIML and HAR creates new opportunities to investigate the models' interpretability and explainability. Gaining an understanding of the system's decision-making process is essential for its effective implementation, especially in delicate applications like health monitoring.

This research has broad potential applications in a variety of fields, such as health and wellness, where ongoing observation and feedback can have important consequences. Furthermore, context-aware mobile applications that incorporate AIML-enhanced HAR models show promise for improving user experience and personalization. Essentially, this project pushes the limits of what is possible in data-driven human activity recognition systems used in real-world scenarios by conducting an extensive investigation of the mutually beneficial relationship between AIML and HAR.

**INTRODUCTION**

* 1. **BACKGROUND**

With the increasing availability of smartphones equipped with sophisticated sensors such as accelerometers, gyroscopes, and magnetometers, human activity recognition, or HAR, has garnered significant attention. These gadgets provide ongoing behavioral tracking of people without the need for specialized hardware or wearable devices. HAR systems for security surveillance, sports analysis, and health monitoring can all be developed on smartphones. Smartphones are useful for data collection and analysis because of their widespread availability, sophisticated sensor technology, potent processors, and seamless connectivity.

* 1. **OBJECTIVE**

The goal of this project is to use data from smartphones' built-in sensors to develop a reliable system for identifying human activities. Large datasets will be gathered and preprocessed, feature extraction methods will be investigated, classification models will be put into practice and assessed, and transfer learning tactics will be looked into. The system's ability to be applied to various demographic groups, environmental conditions, and populations will be evaluated. Evaluation will also be given to the solution's possible effects on a range of applications, including safety monitoring, fitness tracking, and healthcare. To guarantee the project's relevance and practical applicability, stakeholders and domain experts will collaborate. The project's objectives are to investigate the significance of human activity recognition, its uses, and potential future paths for this field of study.