19-08-2024

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**WEEK -1 REPORT**

**1**

**Meeting with Dr. Ashok Jammi Regarding Project Discussion**

**Minutes of Meeting  
Date:** 15-08-2024  
**Time:** 3:30 PM

**Stakeholders:**

* Dr. Ashok Jammi
* Tharun Varada
* Eswari B

**Topics Discussed:**

1. Introduction to cold-formed steels and their applications.
2. Review of the research paper on reinforced concrete (RC) shear walls ([link](https://www.sciencedirect.com/science/article/pii/S0141029619344761)).
3. Exploration of a GitHub repository for a similar project.

**2**

**Project Progress:**We have begun reviewing and understanding the research paper. Below are the key points we have gathered so far:

1. **Importance of Reinforced Concrete Shear Walls**
   * **Critical Role:** Shear walls are essential in buildings for resisting lateral forces, particularly during seismic events.
   * **Safety Concerns:** Post-earthquake evaluations and experimental studies reveal the inadequate safety margins of shear walls, underscoring the need for enhanced failure mode prediction methods.
2. **Machine Learning for Failure Mode Identification**
   * **Objective:** The study utilizes advancements in machine learning to predict shear wall failure modes based on geometric configurations, material properties, and reinforcement details.
   * **Database:** A robust database of 393 experimental results for shear walls with various configurations has been compiled.
   * **Machine Learning Models Evaluated:** Eight models—Naïve Bayes, K-Nearest Neighbors, Decision Tree, Random Forest, AdaBoost, XGBoost, LightGBM, and CatBoost—were analyzed to identify the most accurate model.
3. **Results and Proposed Model**
   * **Random Forest Model:** The Random Forest method proved to be the most effective, achieving 86% accuracy in identifying shear wall failure modes.
   * **Critical Parameters:** Aspect ratio, boundary element reinforcement indices, and the wall length-to-thickness ratio were identified as key factors influencing failure modes.
4. **Contribution to the Field**
   * **Open-Source Model:** The study offers an open-source, data-driven classification model for failure mode prediction, designed for global use in design offices. The model is adaptable, allowing for continuous updates as new experimental data becomes available.

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