

Week 1: Literature Review and Data Collection

Tasks Completed:

Literature Survey:

Reviewed 5+ research papers (e.g., Delli & Chang 2018, Sharma et al. 2022).

Identified gaps: Limited studies on ML-based tensile strength prediction using layer height, wall thickness, and nozzle temperature.

Dataset Acquisition:

Primary dataset sourced from Kaggle's *3D Printer Dataset for Mechanical Engineers* (200+ entries).

Supplemental data from Sharma et al. (2022) and Jayasudha et al. (2022) (50+ entries merged).

Project Scope Definition:

Target variable: Tensile strength (MPa).

Key features: Layer height (mm), wall thickness (mm), nozzle temperature (°C), material type (PLA/ABS).

Excluded parameters: Infill pattern, print speed (low correlation observed in preliminary analysis).

Challenges Faced:

Missing values in Kaggle dataset (e.g., incomplete nozzle temperature entries).

Discrepancies in data formats between Kaggle and research paper datasets.

Outcomes:

Drafted **Introduction** and **Literature Survey** sections.

Compiled a consolidated dataset for preprocessing.

Tasks Planned for Week 2:

Clean and preprocess data (handle missing values, encode categorical variables).

Perform exploratory data analysis (EDA) to visualize correlations.

Prepare data for model training (train-test split).