Architecture Document

Concrete Strength Prediction System

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1. Introduction

The Concrete Strength Prediction System aims to predict the compressive strength of concrete based on various input features. This document provides an overview of the system architecture, focusing on its essential components and data flow.

2. System Overview

The system consists of the following key components:

- Data Pre-processing
- Model Training
- Model Evaluation
- Model Deployment
- User Interface

3. Components

Data Pre-processing:

- Responsible for preprocessing the raw data, handling missing values, and scaling features.

Model Training:

- Utilizes preprocessed data to train machine learning models for predicting concrete compressive strength.

Model Evaluation:

- Evaluates the trained models using performance metrics such as mean absolute error and mean squared error.

Model Deployment:

- Deploys the trained models as a prediction API using Flask or a similar framework.

User Interface:

- Provides a simple interface for users to input data and receive predictions.

4. Data Flow

1. Raw data is preprocessed to handle missing values and scale features.
2. Preprocessed data is used to train machine learning models.
3. Trained models are evaluated for performance.
4. The best-performing models are deployed as a prediction API.
5. Users interact with the system through the user interface, providing input data and receiving predictions.

5. Technology Stack

- Programming Language: Python
- Libraries: pandas, scikit-learn, xgboost, Flask
- Cloud Platform: AWS (for deployment)

6. Deployment Architecture

The system can be deployed on AWS using the following architecture:

- EC2 instance for hosting backend services and prediction API
- S3 for storing static files and model artifacts
- Route 53 for DNS routing
- CloudWatch for monitoring and logging