Modeling Earthquake Damage

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Overview

01

Background and Problem Statement

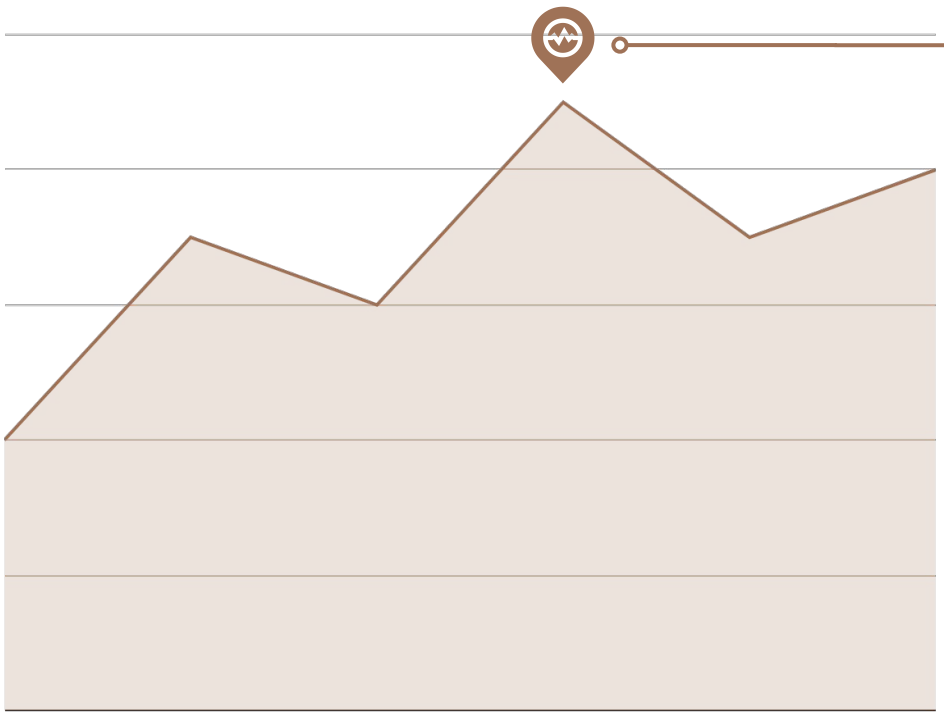
02

Data and Modeling

03

Findings

Background



7.8 Magnitude of the main shock

Gorkha Earthquake

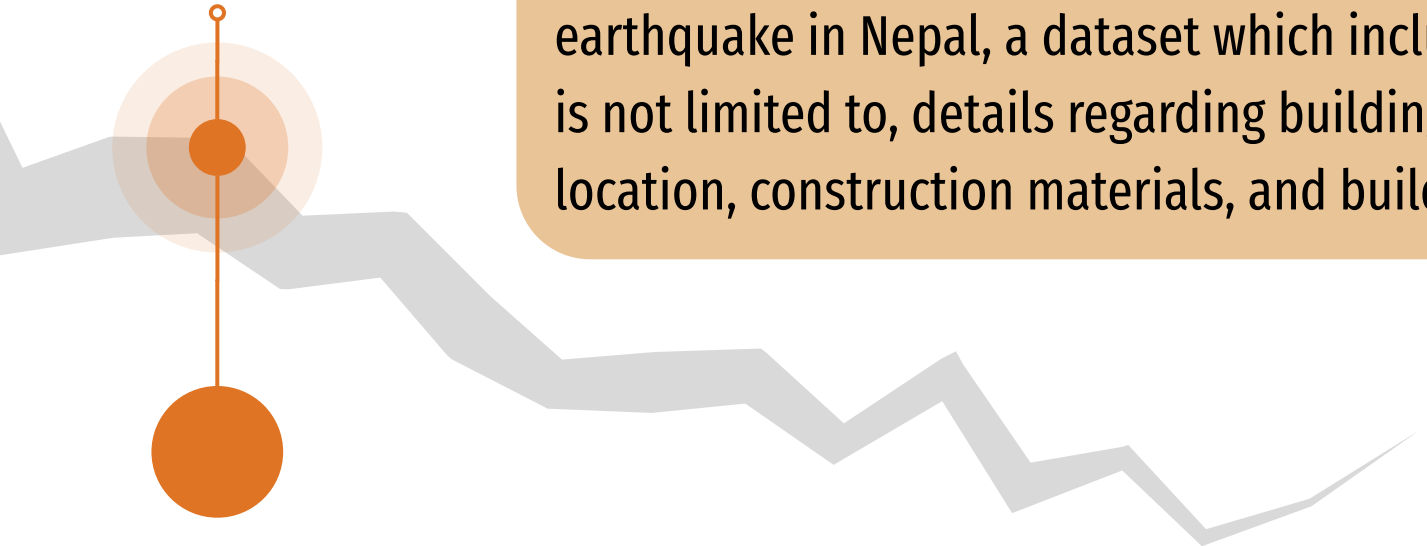
Kathmandu, Nepal

April 2015

600,000+ structures impacted

Problem Statement

This project will predict the level of damage a structure endured using data from the 2015 Gorkha earthquake in Nepal, a dataset which includes, but is not limited to, details regarding building location, construction materials, and building age.



About the Data

Collection

- Kathmandu Living Labs
- Central Bureau of Statistics

Dataset Size

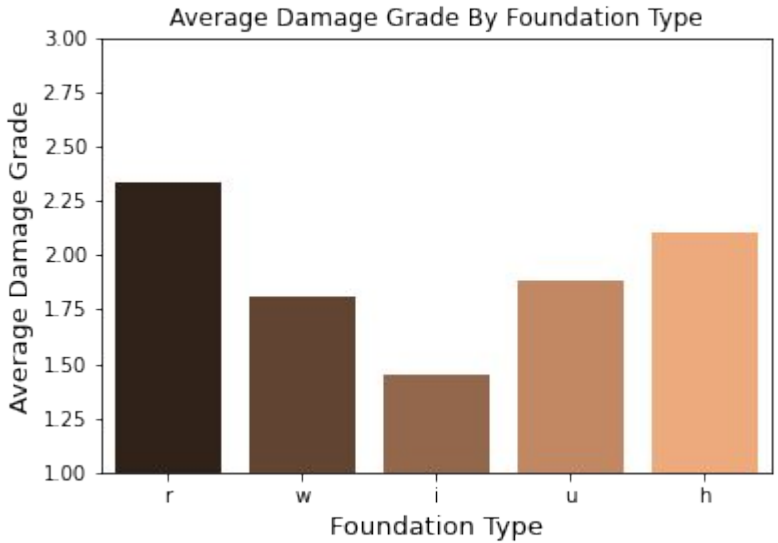
- Information on 260,000+ damaged buildings
- 39 features

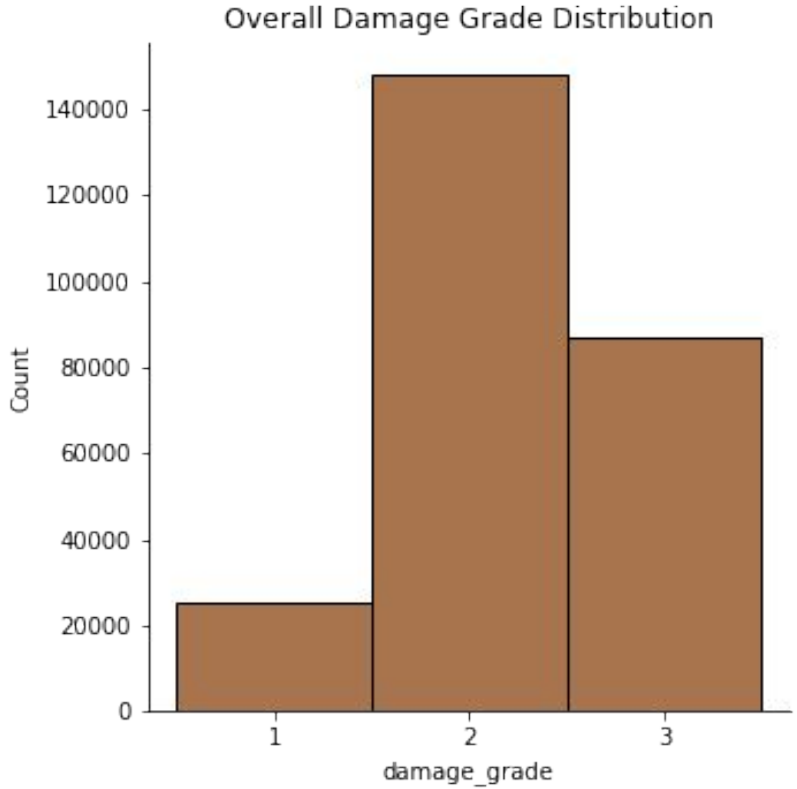
Features

- Geographic region
- Building age
- Number of floors, and more

Damage Grade

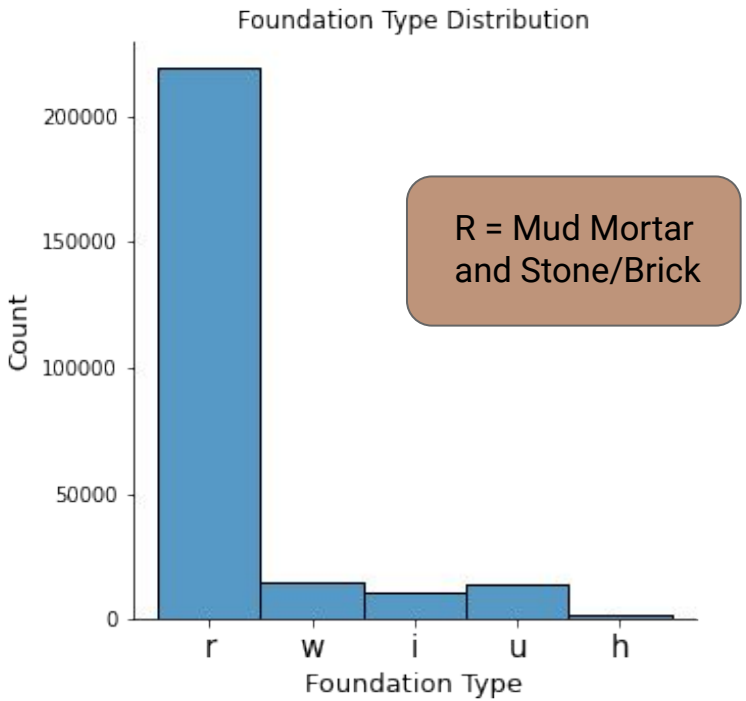
Grade 1: Low Damage
Grade 2: Medium Damage
Grade 3: Almost complete destruction





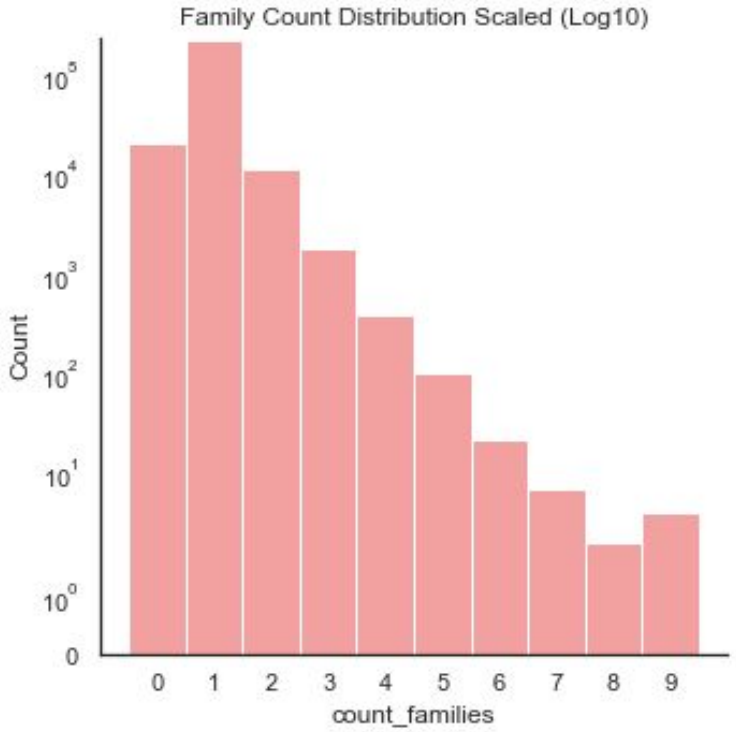
Our Features

Categorical



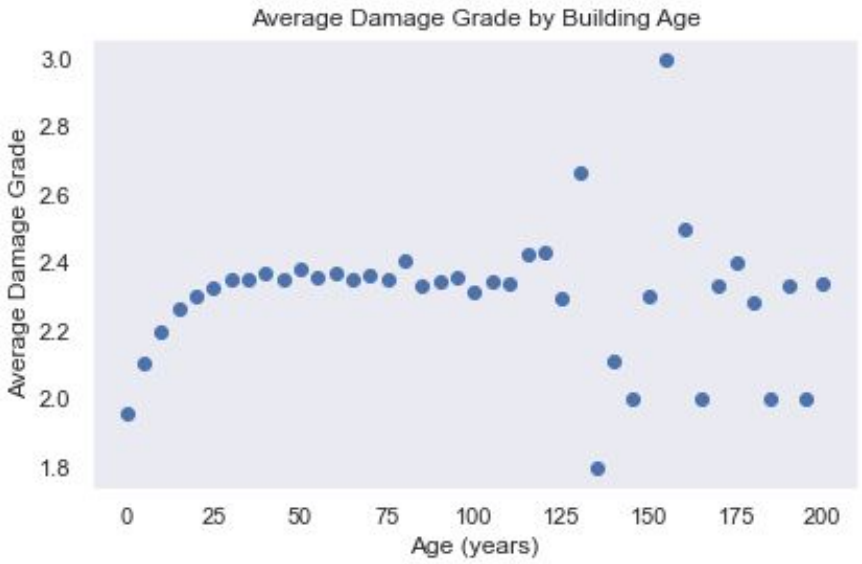
R = Mud Mortar and Stone/Brick

Numerical



Initial Observations

- Age is less indicative for buildings older than 100 years
- Buildings made from reinforced engineered concrete have the lowest relative damage grade compared to other buildings
- Buildings made from mud mortar and stone have a higher average damage grade than other types.



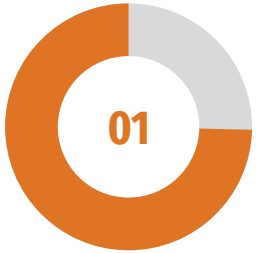
Initial Modeling

Classification Model

Types of Models

Metrics

Model Comparison

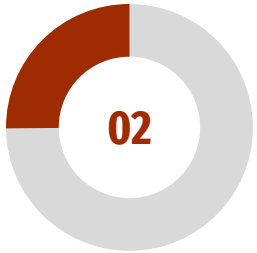


0.71

KNN

Test F1 Score

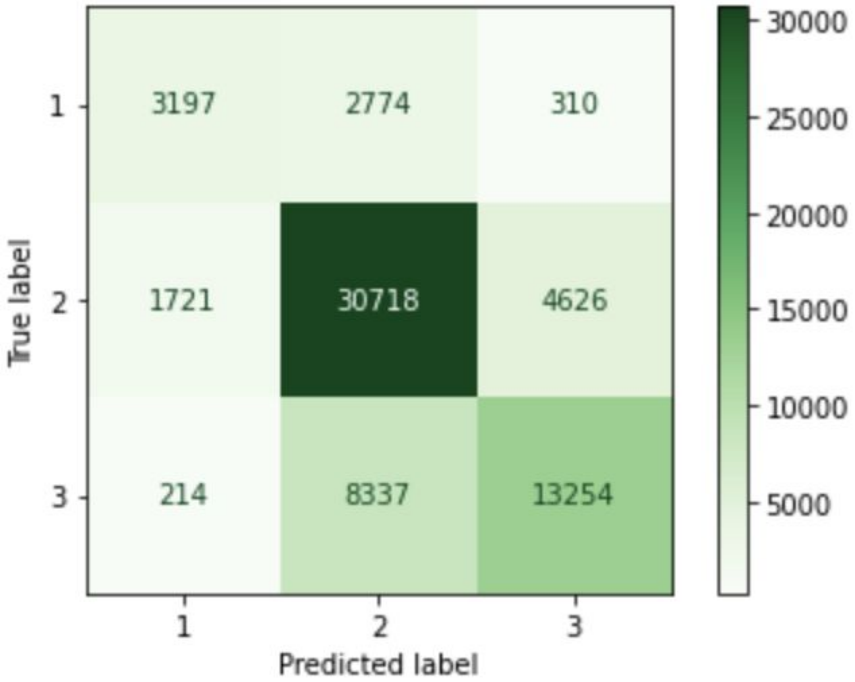
0.68



GBC

Test F1 Score

KNN Performance



F1 Score: 71%

Baseline: 56%

Feature Importance

Feature	Coefficient
area_percentage	0.189
ground_floor_type_v	0.131
roof_type_x	0.103
foundation_type_i	0.081
has_superstructure_cement_mortar_brick	0.080

Questions?