ONSTRUCTING INTELLIGENCE

Procore Technologies – Machine Learning
Capstone 2016–2017
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Motivation

Two main challenges of Construction Projects:
- Staying on schedule
- Safety

These can delay the finished product and can be PRICEY!
An observation is an indication of a hazard or defect on a project, made by any worker on the jobsite, usually the foreman.

Submittals are required primarily for the architect and engineer to verify that the correct products and quantities will be installed on the project in compliance with the design documents/contract documents.
## Features & Targets

### Submittals
- `cached_distribution_sent_date` → the issue date of a submittal
- `due_date` → the date a submittal should be completed by
- `submittal_type` → the category of a submittal (i.e. materials, plans, etc.)

### Observations
- `attachments_count` → how many media attachments an observation has (could potentially indicate urgency)
- `status` → what stage the submittal is in
- `priority` → indicates the importance of the observation

### Targets
- `is_late` → binary indicating if submittal is late or not
- `num_days_late` → how many days late a submittal is
- `observed_safety_score` → cumulative score based on number of attachments and urgency/status of observation
Our Solution

- Implement machine learning techniques
- Train models using previous company data
- Create a company’s “schedule” and “safety” score with these trained models
Dummy Coding

Categorical variables → Dichotomous variables
K-Fold Cross Validation

*Running on 4 folds (k=4)*
DEMO
Inside AWS instance:
I. Model is loaded
II. Project data requested
III. Data is preprocessed
IV. Data is run through model
V. Score is calculated
VI. Score is send back to extension
- Depending on what quartile a particular project falls in, we place it into that range of similarly ranked projects.
Your schedule percentile: Top 25%

Improvements:
- Increase submittal_type

Your safety percentile: Bottom 25%

Improvements:
- Increase length_of_description
- Decrease attachment_count

Your schedule percentile: Top 25%

Improvements:
- Increase submittal_type

Your safety percentile: Top 50%

Improvements:
- Decrease attachment_count
The Future

- Understand project progress and safety based on statistical evidence
- Lay the groundwork for future predictive analytics (i.e. financial data)
- Potential to make predictions for projects outside the construction industry
Thank you!

(mic drop.)