



Sibyl


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Problem

Rental Property Managers:

- They have a lot of accounting data sitting in databases with valuable insights into their properties' financial and operational health
 - They don't have the time and expertise to laboriously go through the data
 - The only current projections are through tabular reports which are often overlooked
 - Having visual financial projections would help them manage expectations and optimize operations
- ...
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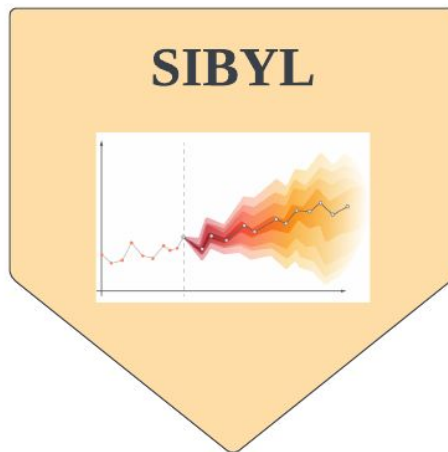
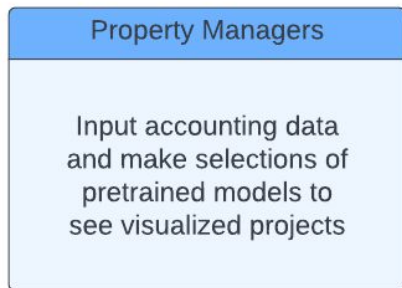
Solution

- Create machine learning models to forecast property management expenditures, income, and other accounting categories
- Train our model using the vast plethora of user-specific property management data
- Leverage dashboard to present predictions using dynamic and interactive graphs that reveal clear insights into accounting health

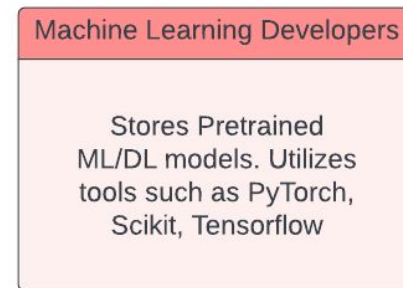
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Functionality

Feed in Data



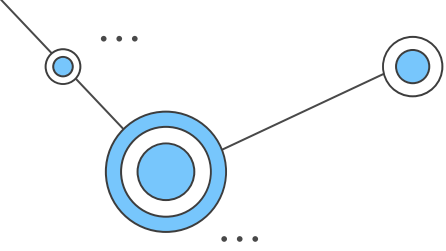
Model Export



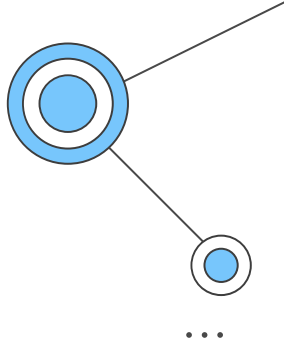
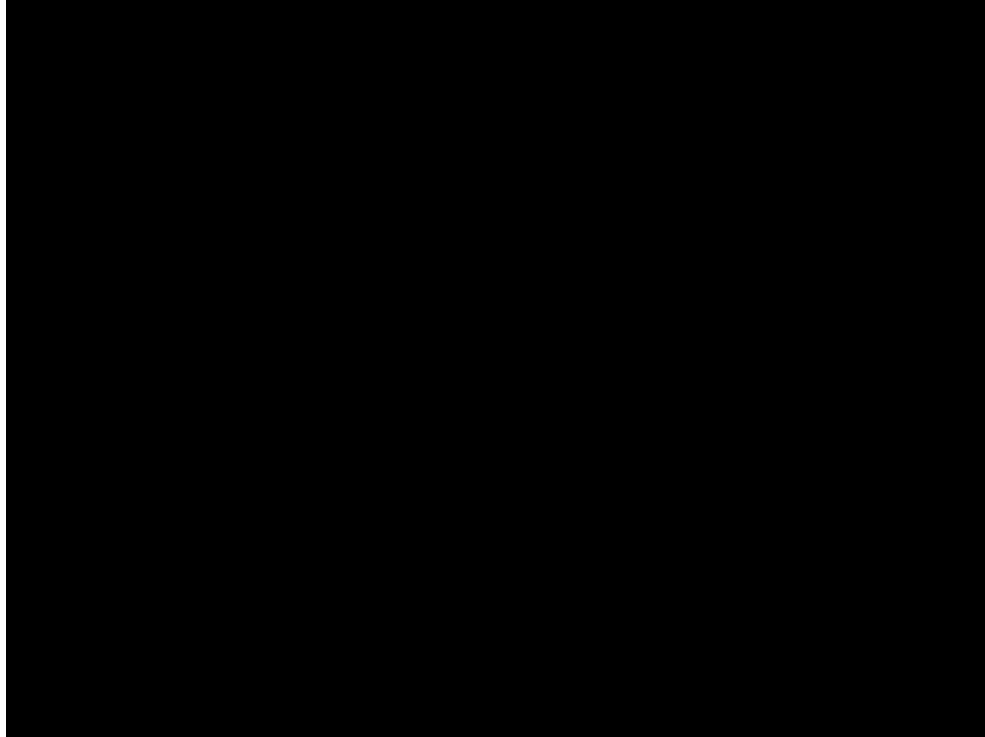
Demo

<http://localhost:3000/>

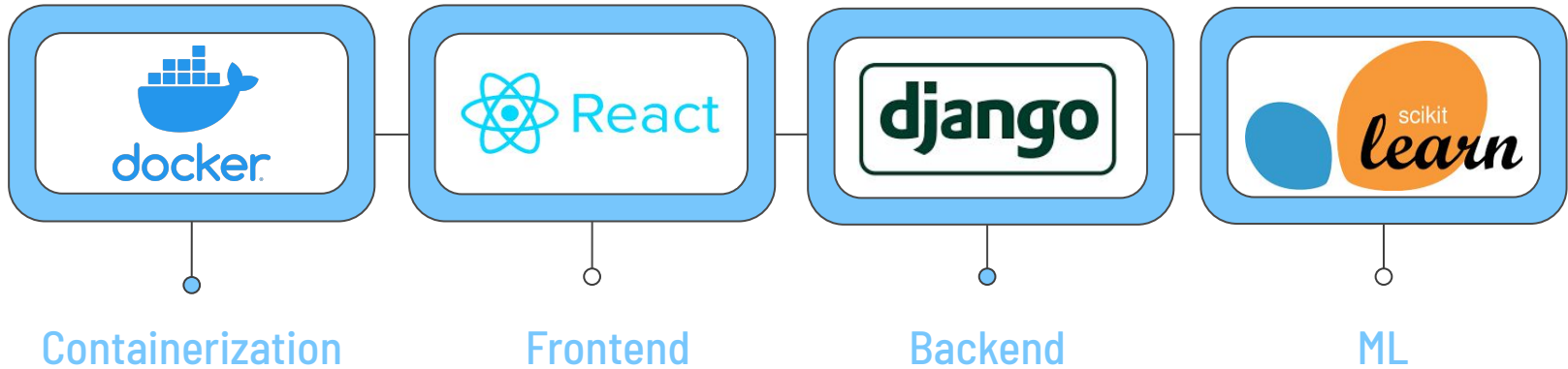




Backup Demo



Technologies



Novelty

01

Tabular Reports

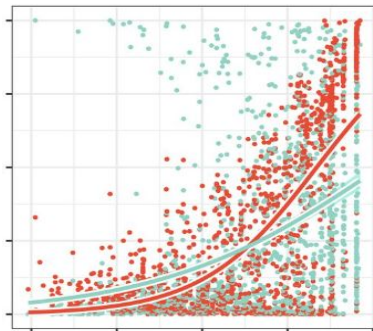
Transform Appfolio's tabular reports into something more meaningful for property managers who may not have data science experience



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Data Modeling

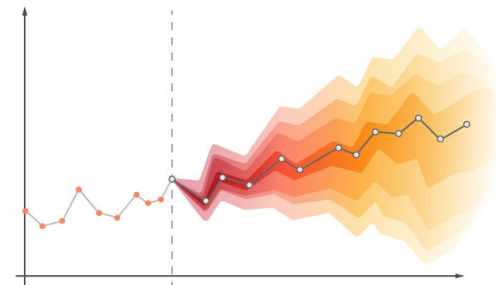
Process data with graphs and visualization techniques to show real model training in a more insight-friendly environment for property managers



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Predictive Analysis

Display model inference and provide accessibility to various models to allow for more complex and thorough predictions



Technicalities

Data/Feature Analysis

- Visualize data to look for trends, outliers, bounds
- Infer meaningful features from categories

Example:

- Use ordinality to transform dates into a feature that is trainable by a model

Prototyping Architecture

- Construct model architecture with an understanding of the characteristics of input features and how to best map them to the output

Example:

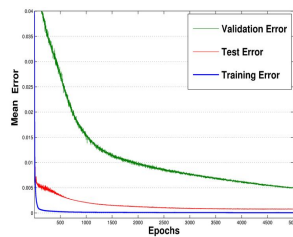
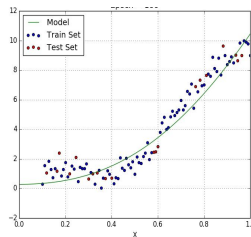
- Produce a Regression, Random Forest, DL, etc

Training/Inference

- Train architecture on training dataset
- Evaluate performance on test set or inference dataset

Example:

- Evaluate the results and error of the model, iterate hyperparameters, and extract better features





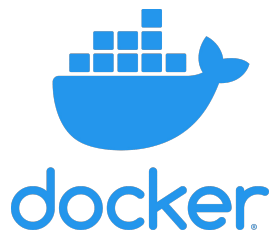
Model Development SW Infrastructure



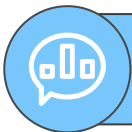
- Docker for containerized environments to run ML models
- Created open ended scripts, with documentation, to run inference on model prototypes for simpler interface for users/front end team

Where STARTTIME and ENDTIME are in format YYYYMMDD and ID is an integer id corresponding to a GL Account ID.

```
python3 scripts/model.py --time STARTTIME,ENDTIME --id ID
```



Challenges



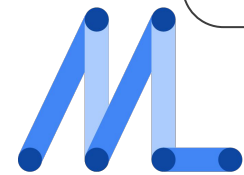
Machine Learning

- Difficult to discern meaningful features from the dataset for future projections
- Importance of Pre-Processing
 - handling empty and null fields -> filtering for valid data points
 - bolster features instead of suppress: normalization, standardization, etc



Frontend

- ML model agnostic data visualization
 - Ability to take in data of different types and predictions from different models with different formats
- UI/UX design
 - Data range and density
 - Interaction design



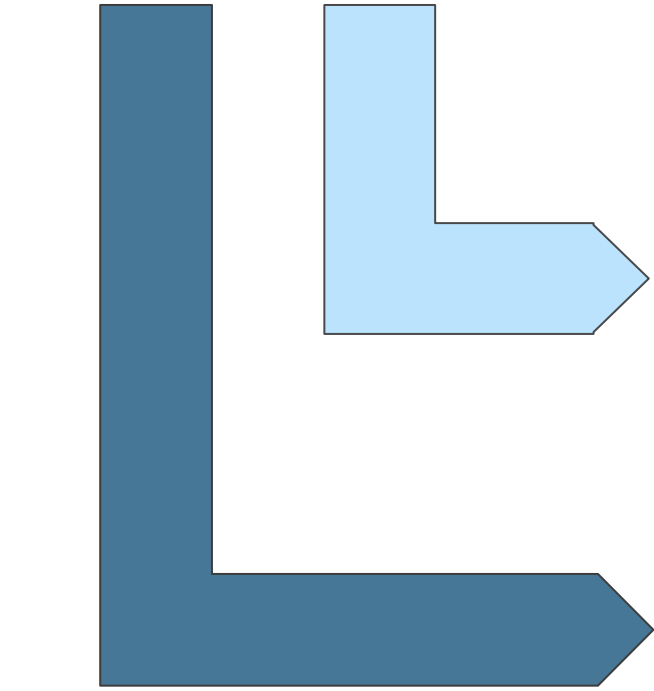


Next Steps

ML/Backend:

- Work with AppFolio to learn better feature extraction or find datasets with better features
- Transition to backend development
 - Build API infrastructure to support model export and calls from front end
 - Focus on creating support for various formats of models, instead of prototyping model

Frontend:

- Dynamic sliding window for graphs to filter by date (year, month, week)
 - Customize dashboard with draggable graph components
 - Search for past predictions
- 



Thank you

A decorative network diagram consisting of several blue circles of varying sizes connected by thin black lines. The circles are arranged in a path that starts from the top right, goes down to a larger circle, then up to another circle, and finally down to a third circle. There are also smaller circles and lines extending from these main paths, creating a web-like structure. The circles have a blue outline and a lighter blue fill, with some having a white inner circle.