



Building Schematic Analyzer

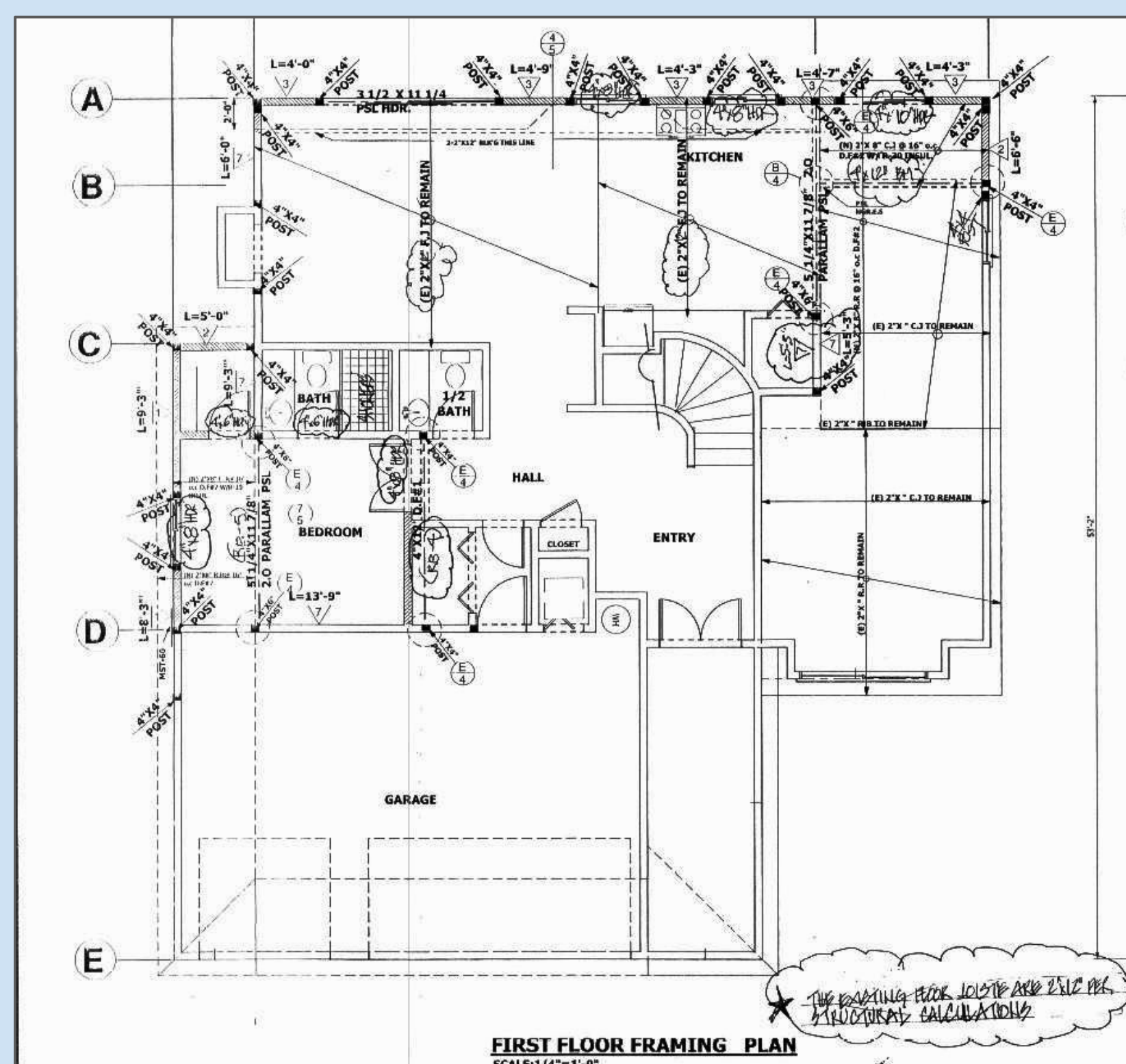
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Background

- Construction companies hire engineers whose attention is distracted by mediocre tasks, such as material estimation, rather than by more complex tasks.
- More often than not, engineers overestimate materials needed for house construction.
 - On average, 8,000 lb of materials is wasted per 2,000 square feet during construction.
- If engineers underestimate materials, delivery cost can be within thousands of dollars, thus affecting company profit.

Objective

- Develop an intelligent software that takes images of city approved structure framing schematics and, through machine learning algorithms along with calculation algorithms, accurately outputs the quantity of materials and associated cost.



Software
Output

Wood quantity:

Option 1

Using 2x6x10ft: 375 pcs
Price Estimate: \$2197.50

Option 2

Using 2x6x8ft: 426 pcs
Price Estimate: \$1997.94

Compressed wood: 15 pcs
4x4 POST: 30 pcs

Process

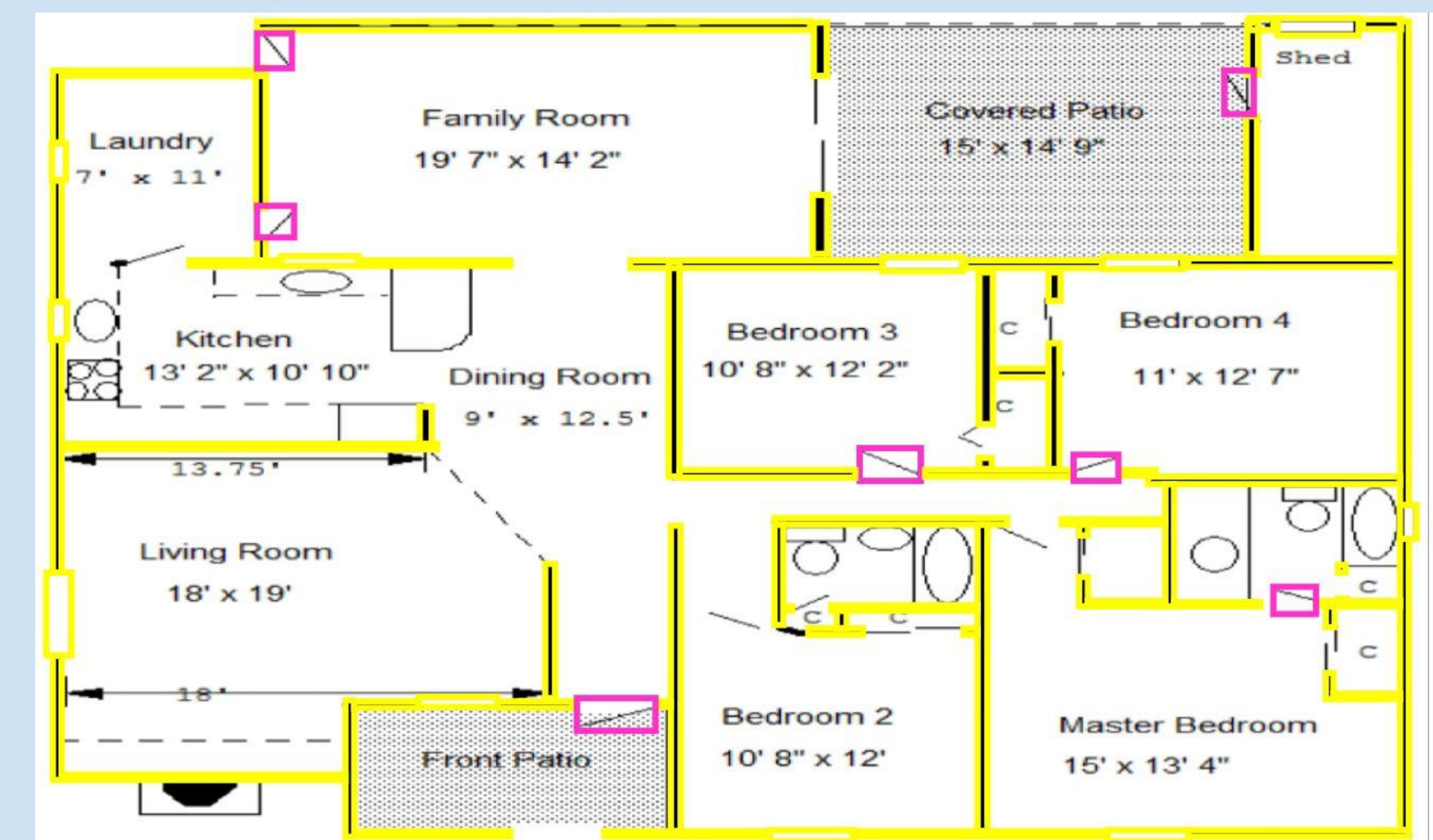
- User takes picture of the framing schematic using our device.
- This image is sent to our pretrained model which extracts key features such as walls, windows, doors, and posts.
- The size and quantity of these features are processed through an algorithm to determine the quantity approximation of materials and costs needed for construction.

Hardware/Software Specs.

- Hardware:
 - Camera module
 - Raspberry Pi
 - Touchscreen monitor
- Software:
 - Resnet
 - Tensorflow
 - Open CV

Progress

- We compared different convolutional neural networks and different feature extraction methods such as object segmentation and object detection to find the best fit for our problem.
- We developed a guideline for target symbols (e.g. post will be denoted as squares with an 'x' therefore we will teach our model this relation).
- We obtained sample schematics with target data and labeled them (shown below) to train the model and by next quarter we plan to have it trained.



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