

Built-in

A GenAI-Based System for Verifying Compliance
Between Floorplans Versions

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Project Review & Definition



MOTIVATION:

Comparing different versions of the same floorplan is difficult for buyers and may lead to financial and legal risks.



TASK:

detect meaningful content changes between two versions of the same floorplan image (before / after).



MODELS:

- Object Detection for structural understanding
- Segmentation for precise change localization
- Logistic Regression for classification



DATA:

- Synthetic data for before / after floorplan pairs
- Known change types and pixel-level masks



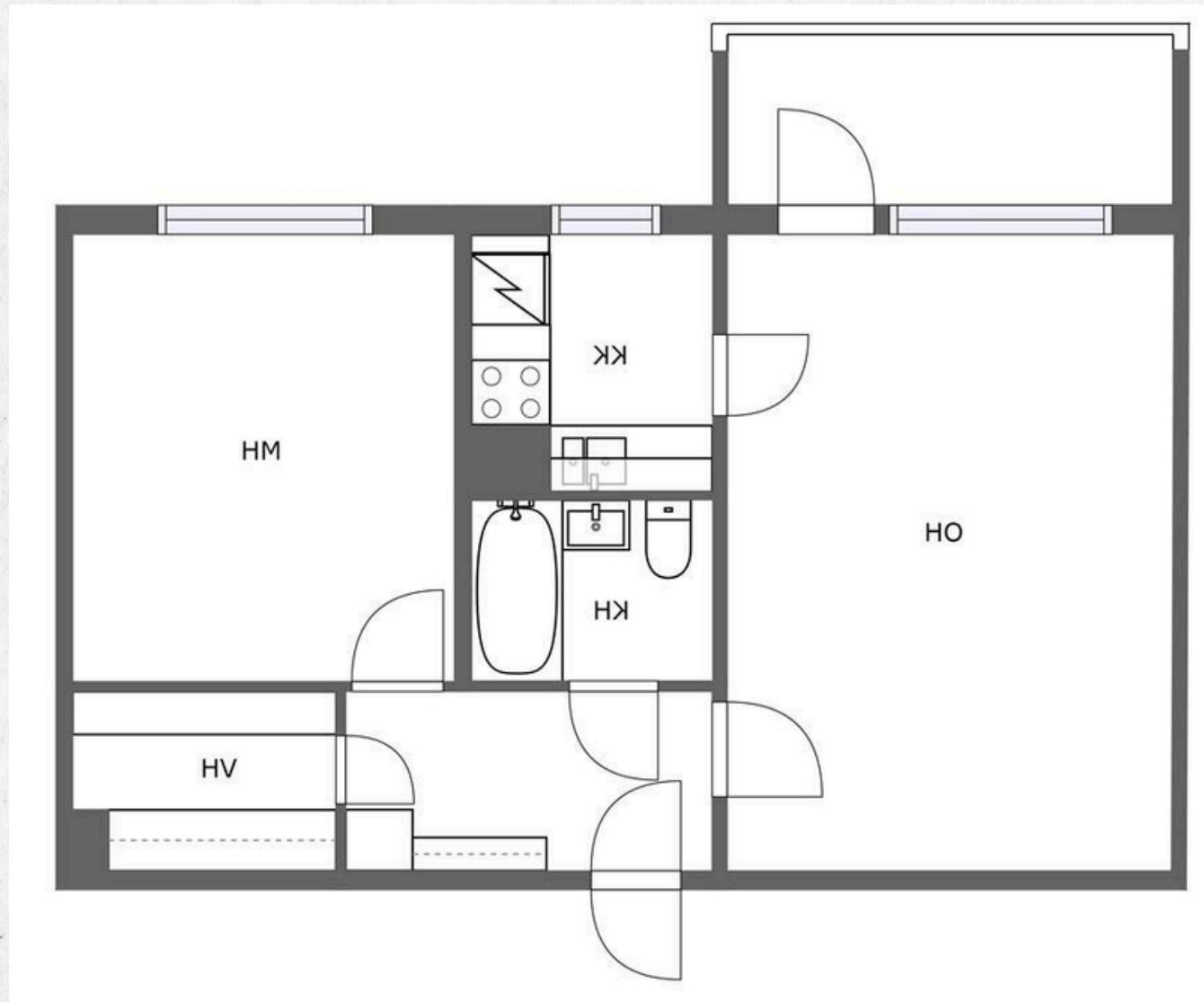
METRICS:

- Accuracy, Precision, Recall, F1-score
- Per change-type evaluation

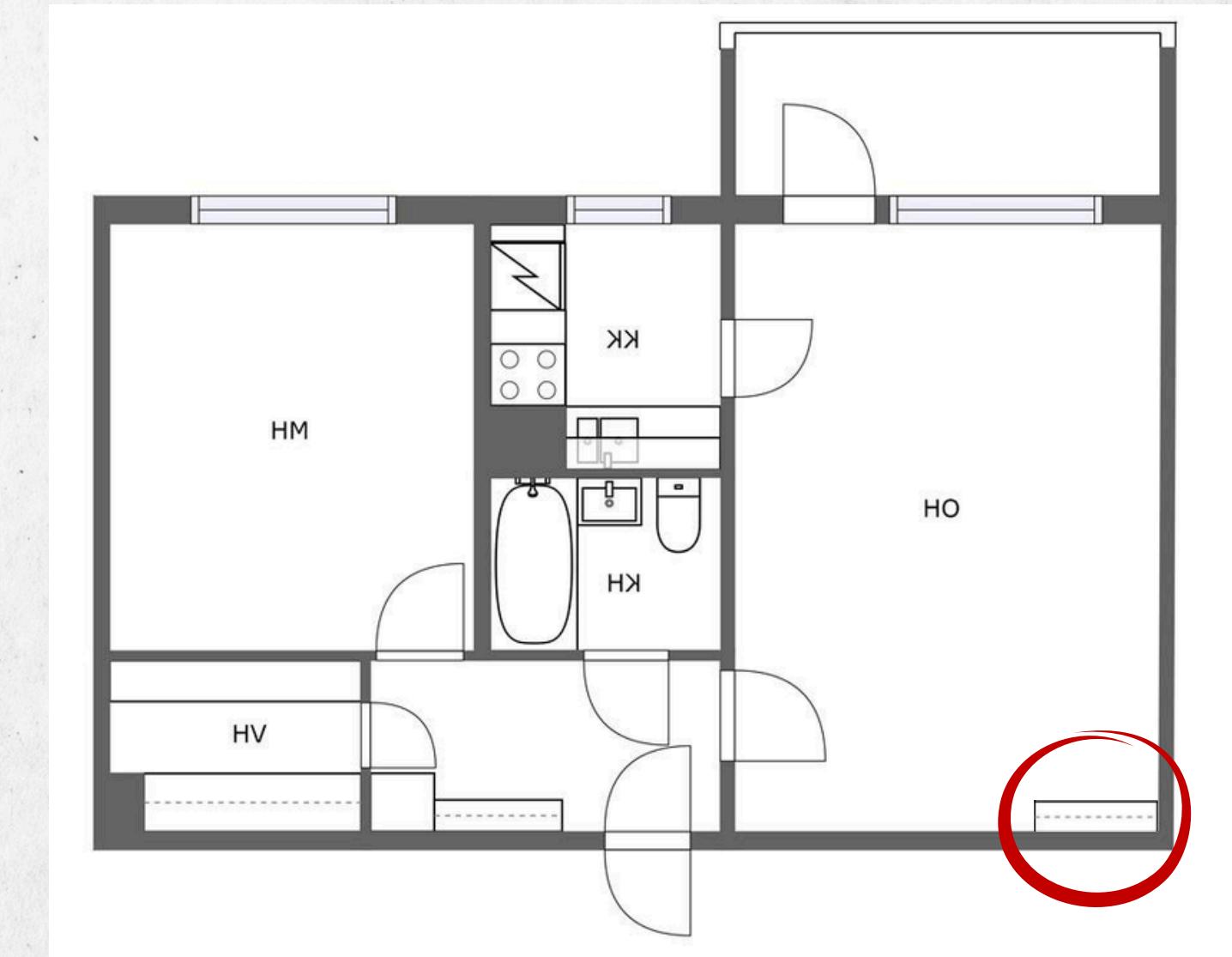
We generate the data needed to teach AI how to understand meaningful design changes.

Example 1

BEFORE:



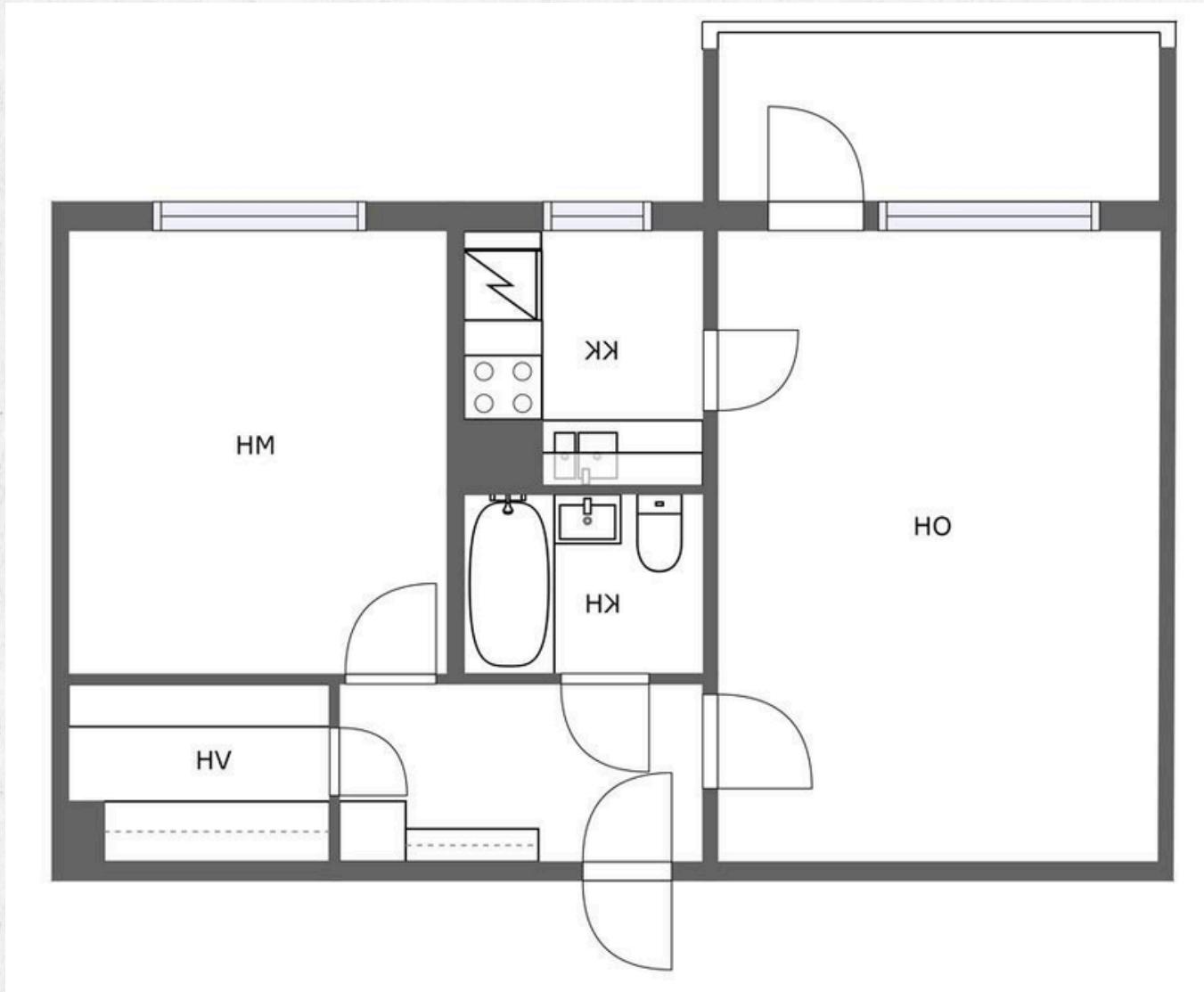
AFTER:



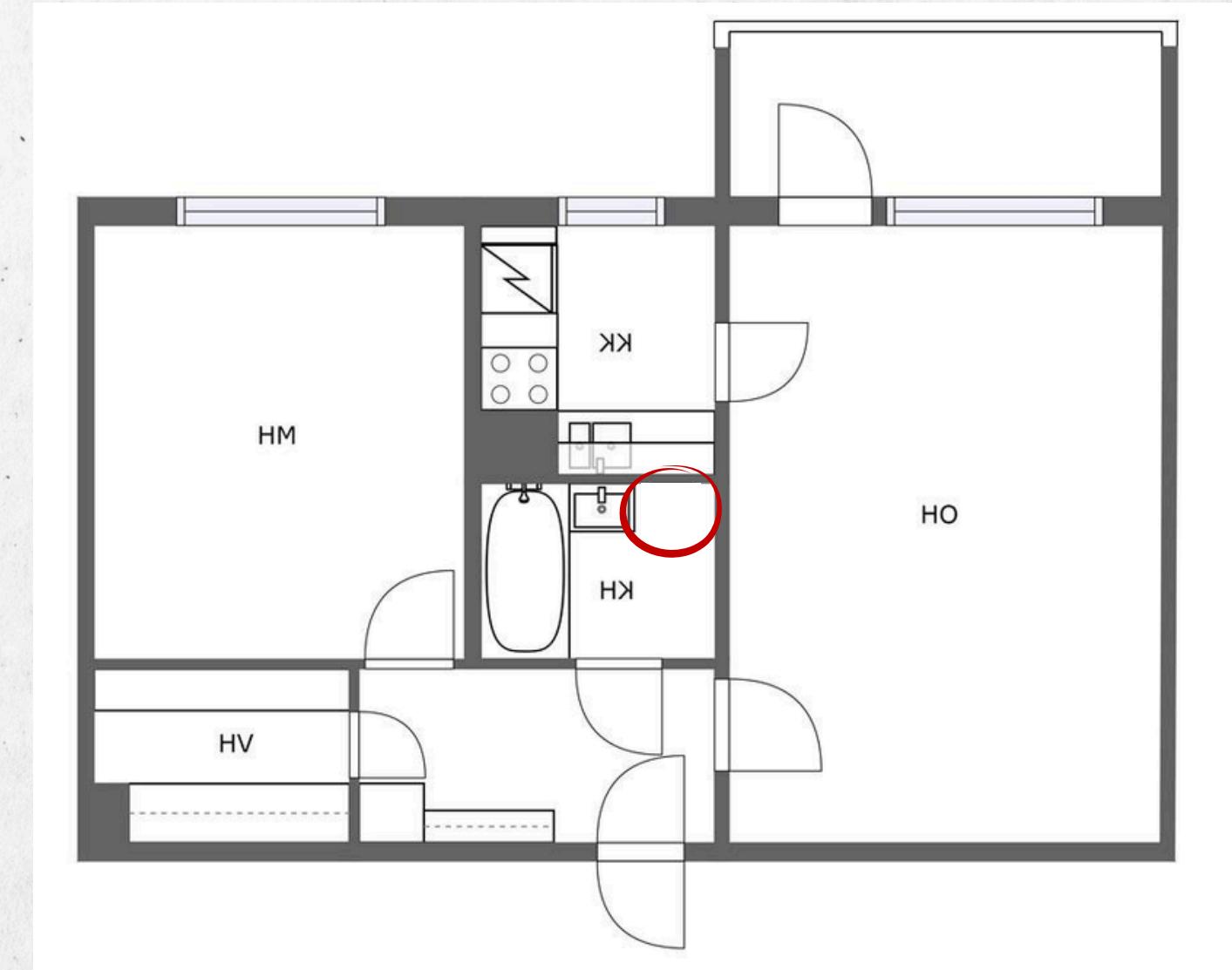
output: 0 – No substantial modification

Example 2

BEFORE:



AFTER:



output: 1 – substantial modification

Project achievements and novelty



PROJECT ACHIEVEMENTS:

- Designed a model-guided generative pipeline for structural floor plan changes
- generated a labeled before / after dataset
- Trained and evaluated a change-type classification model
- Achieved understanding and detection of meaningful content changes.

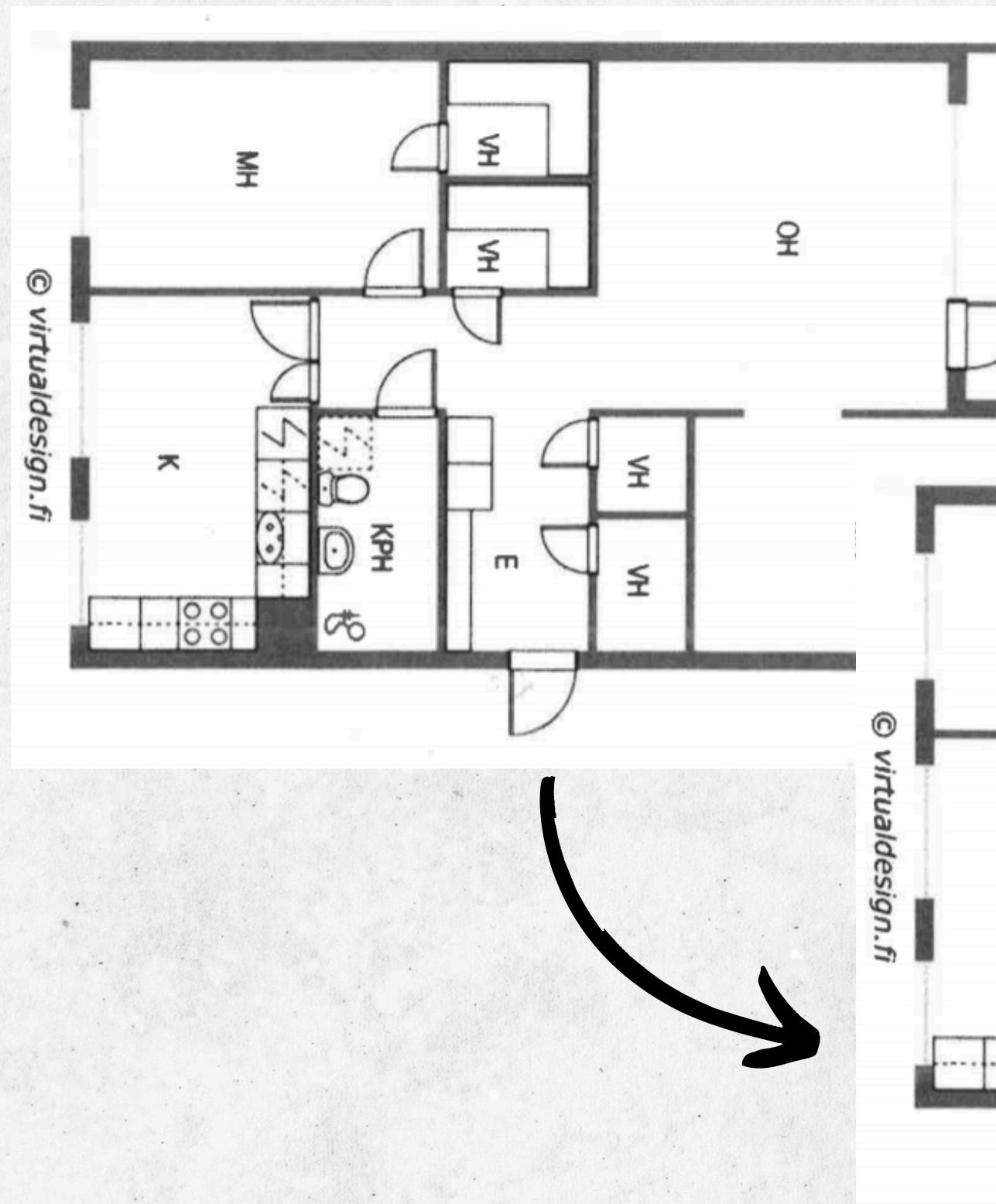


PROJECT NOVELTY:

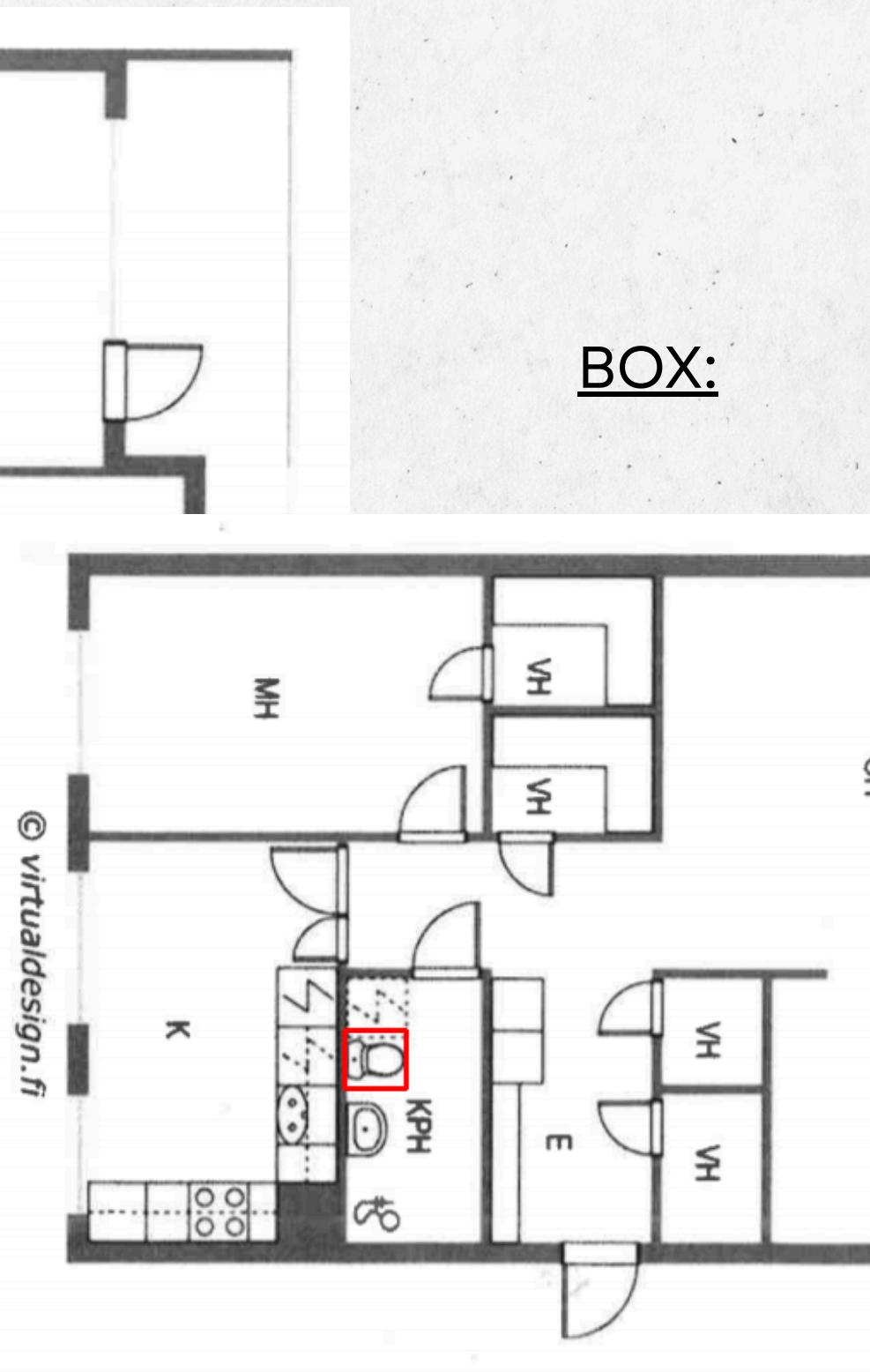
- No existing dataset for floor plan change detection
- Custom synthetic dataset created from real plans
- Controlled, explainable generation with precisely defined change annotations.

Toilet to Stove Example:

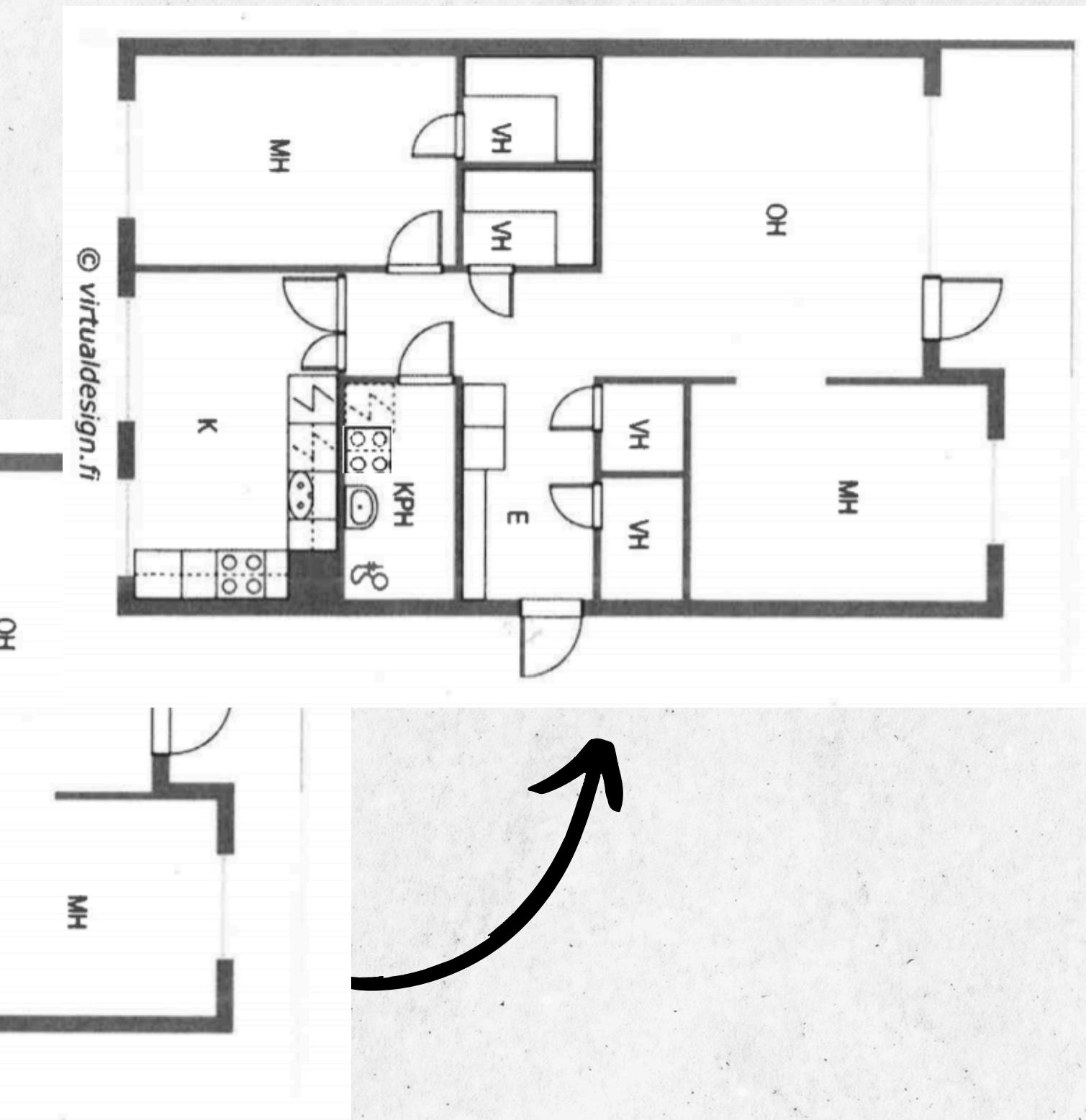
BEFORE:



BOX:

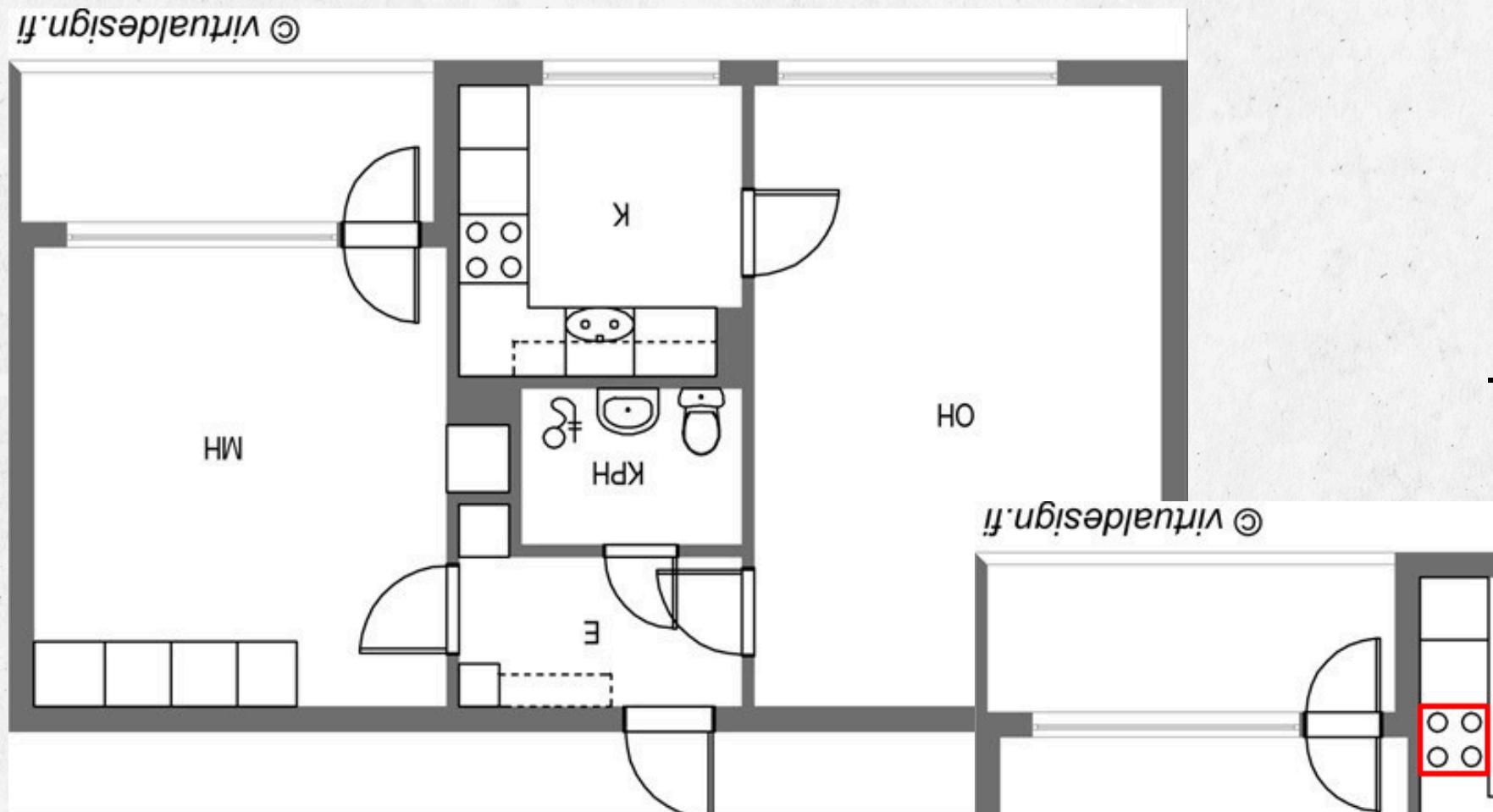


AFTER:

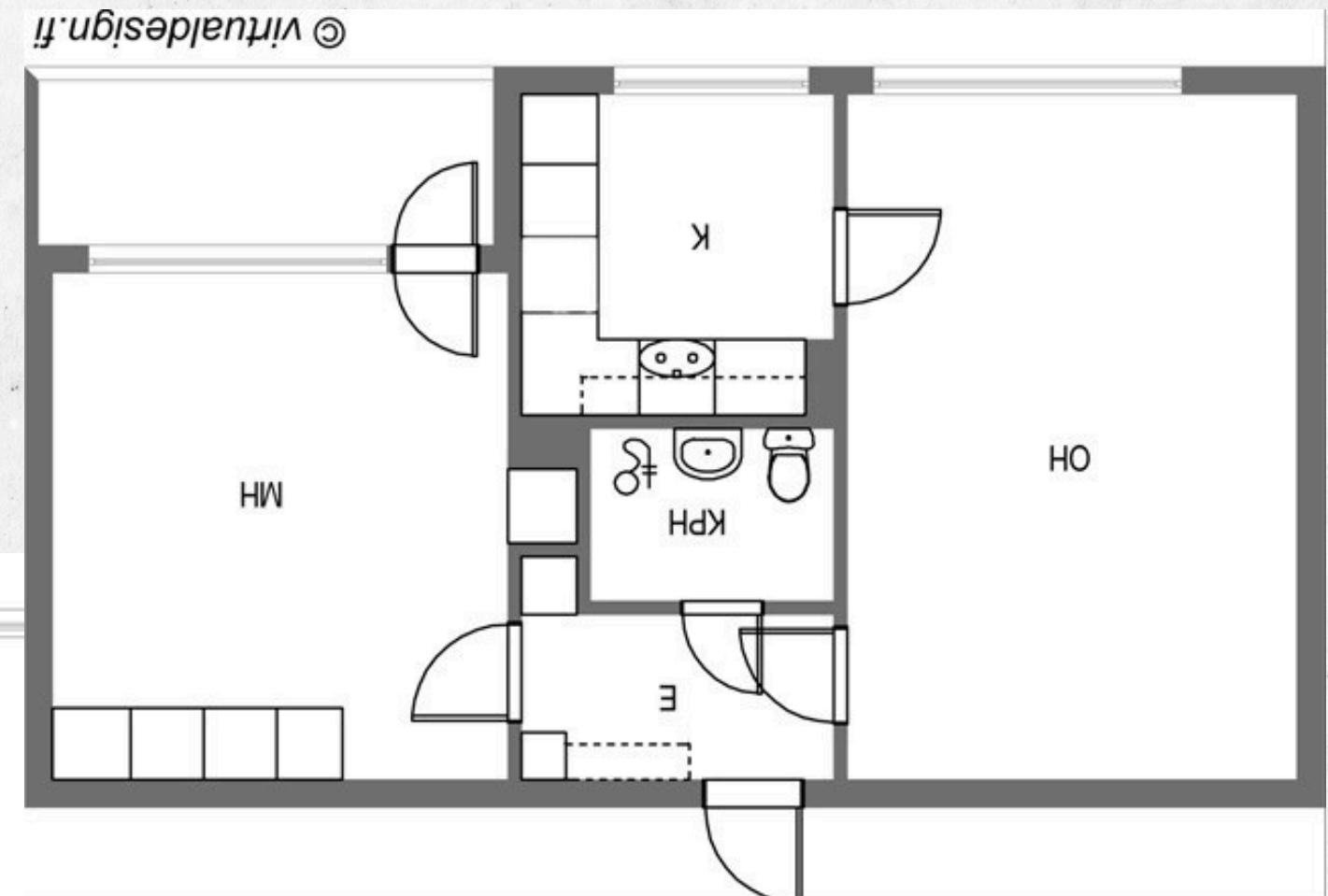


Erase Stove Example:

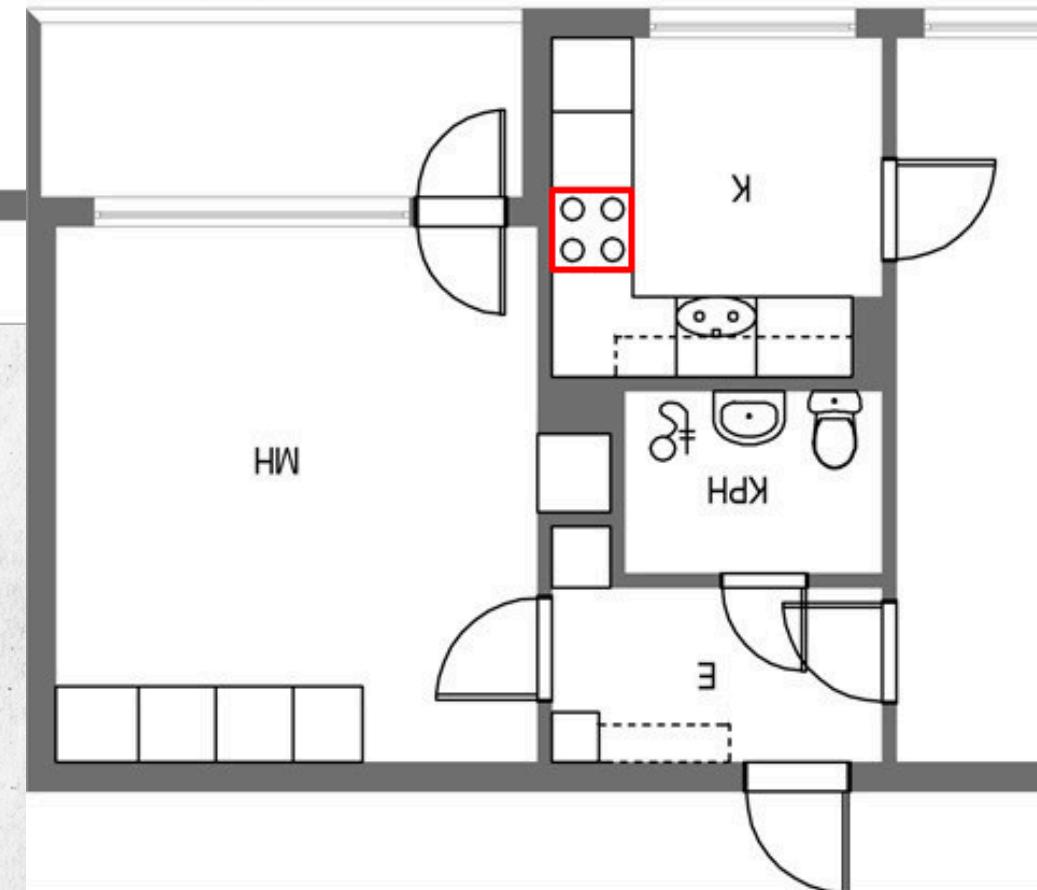
BEFORE:



AFTER:

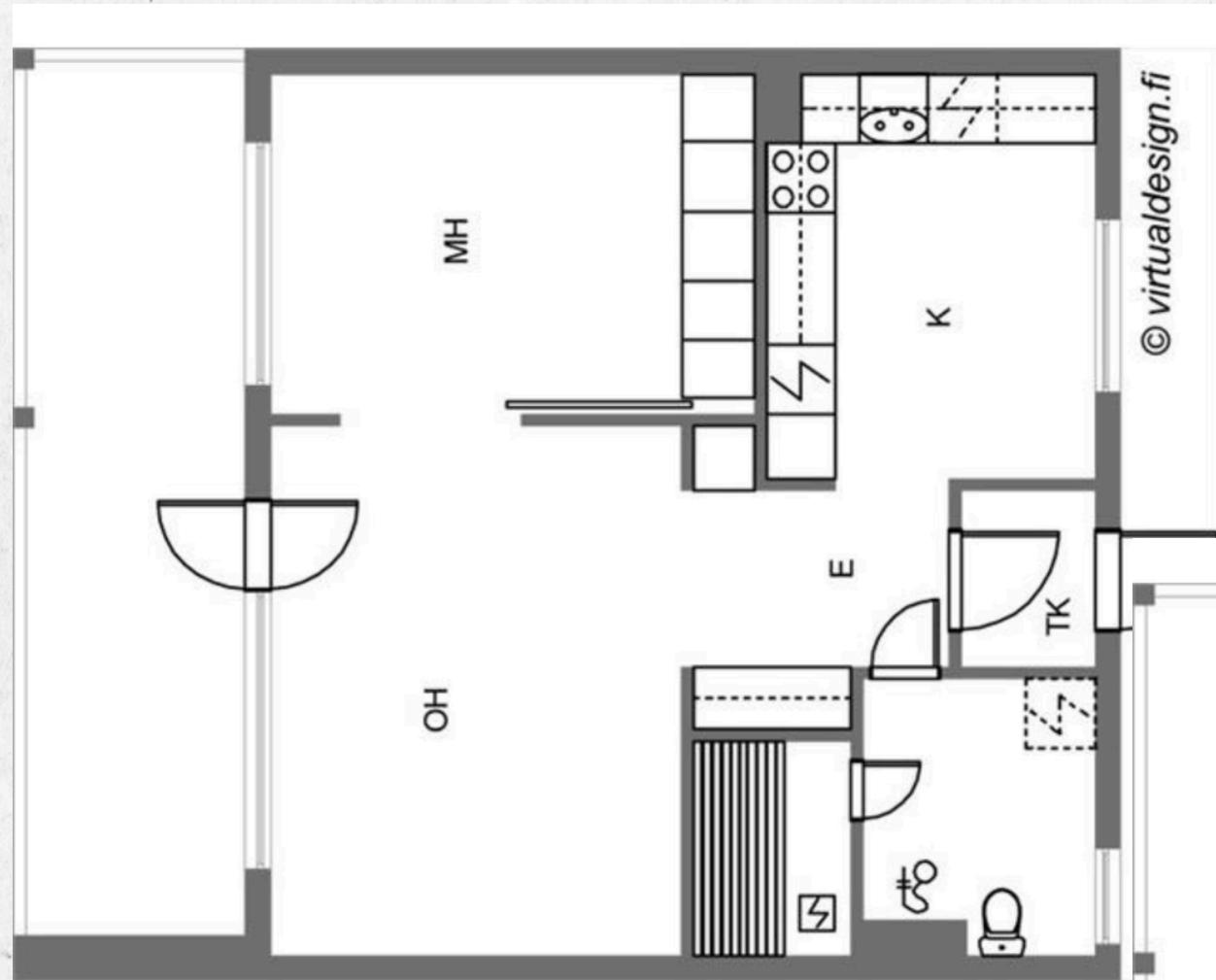


BOX:

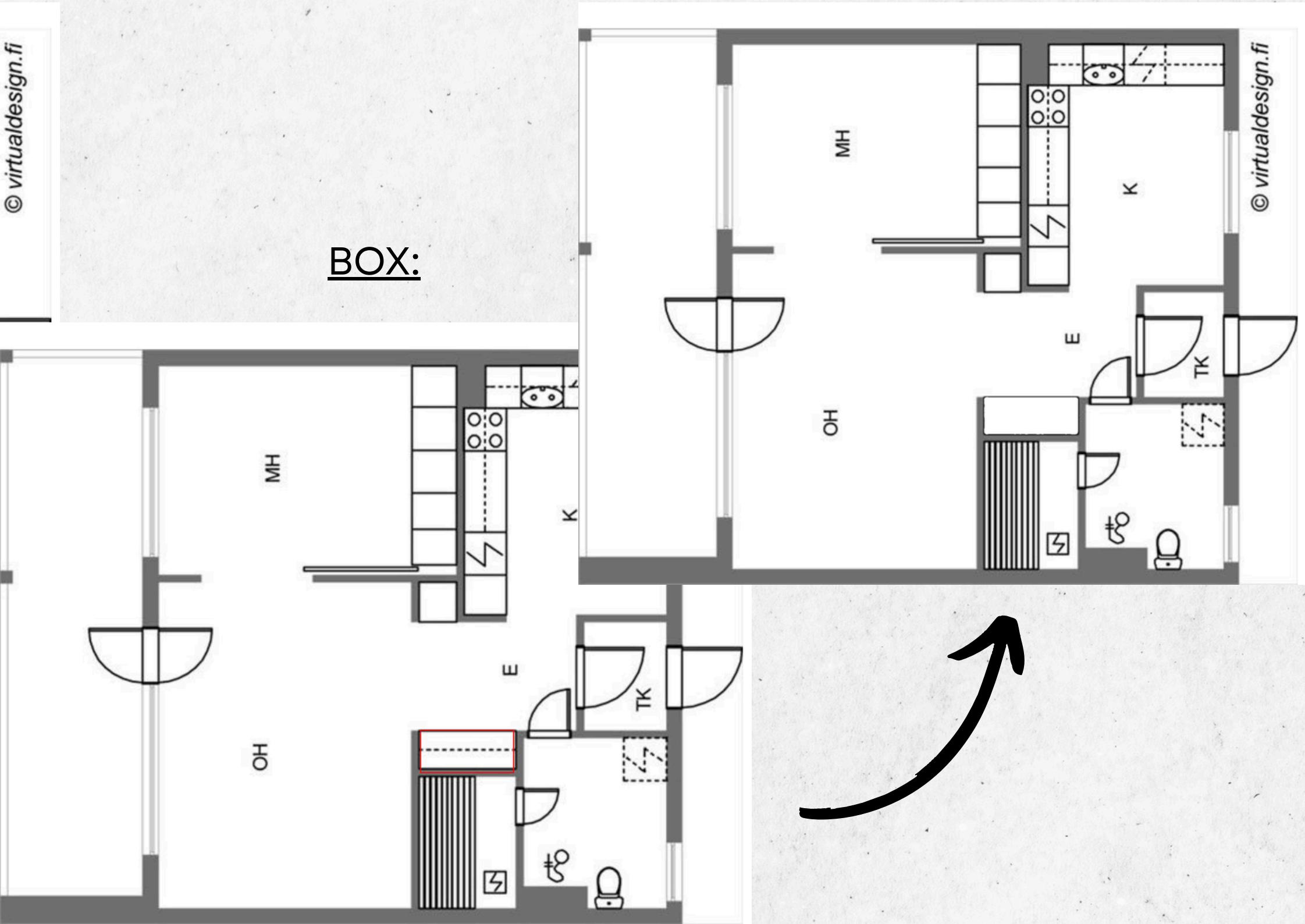


Erase Closet Example:

BEFORE:



AFTER:



NON - SUBSTANTIAL CHANGE CREATION

Review methodology



SYNTHETIC DATA GENERATION:

- DETR for object detection and localization
- SAM for precise region segmentation
- Controlled patch-based edits to create before / after pairs



EVALUATION STRATEGY:

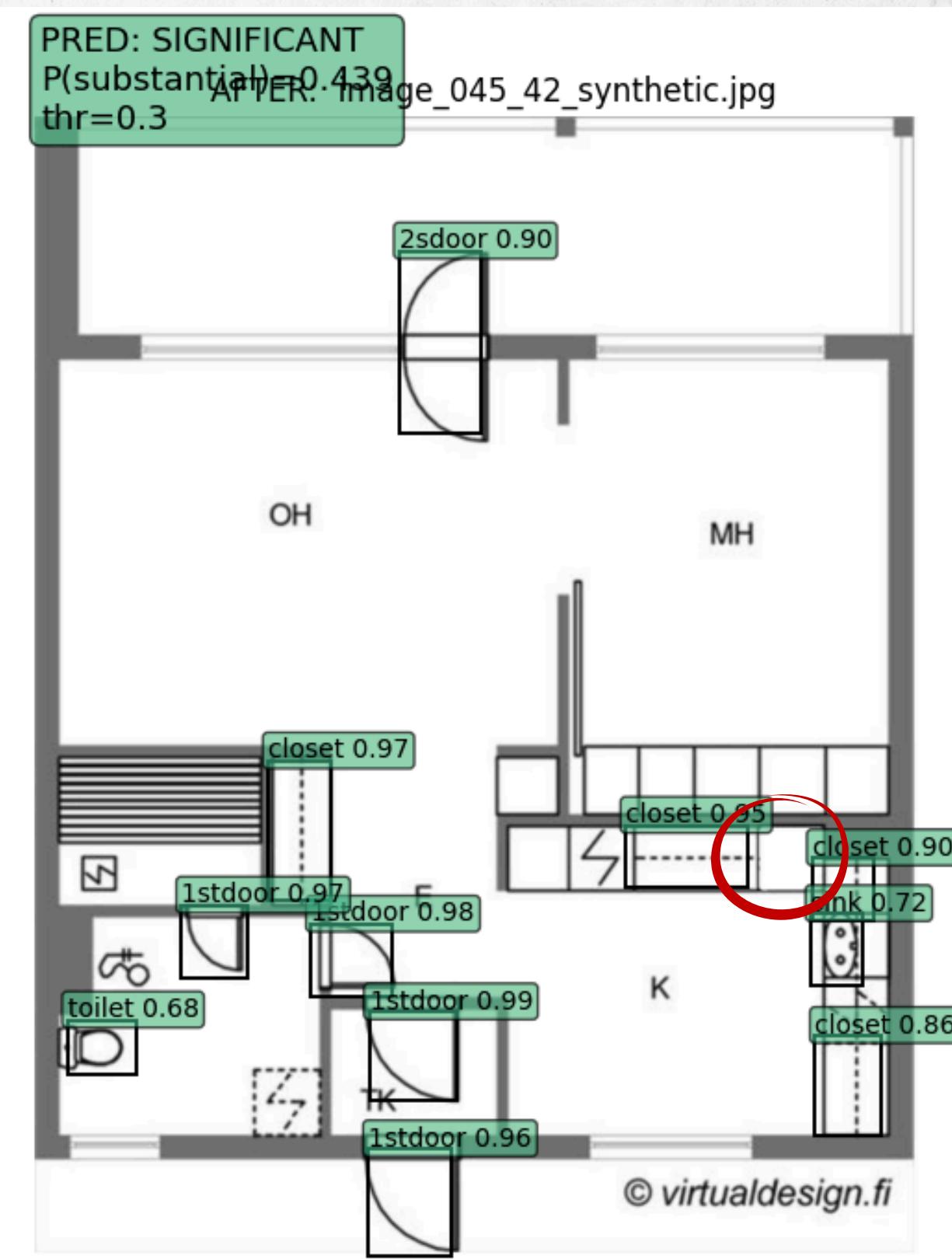
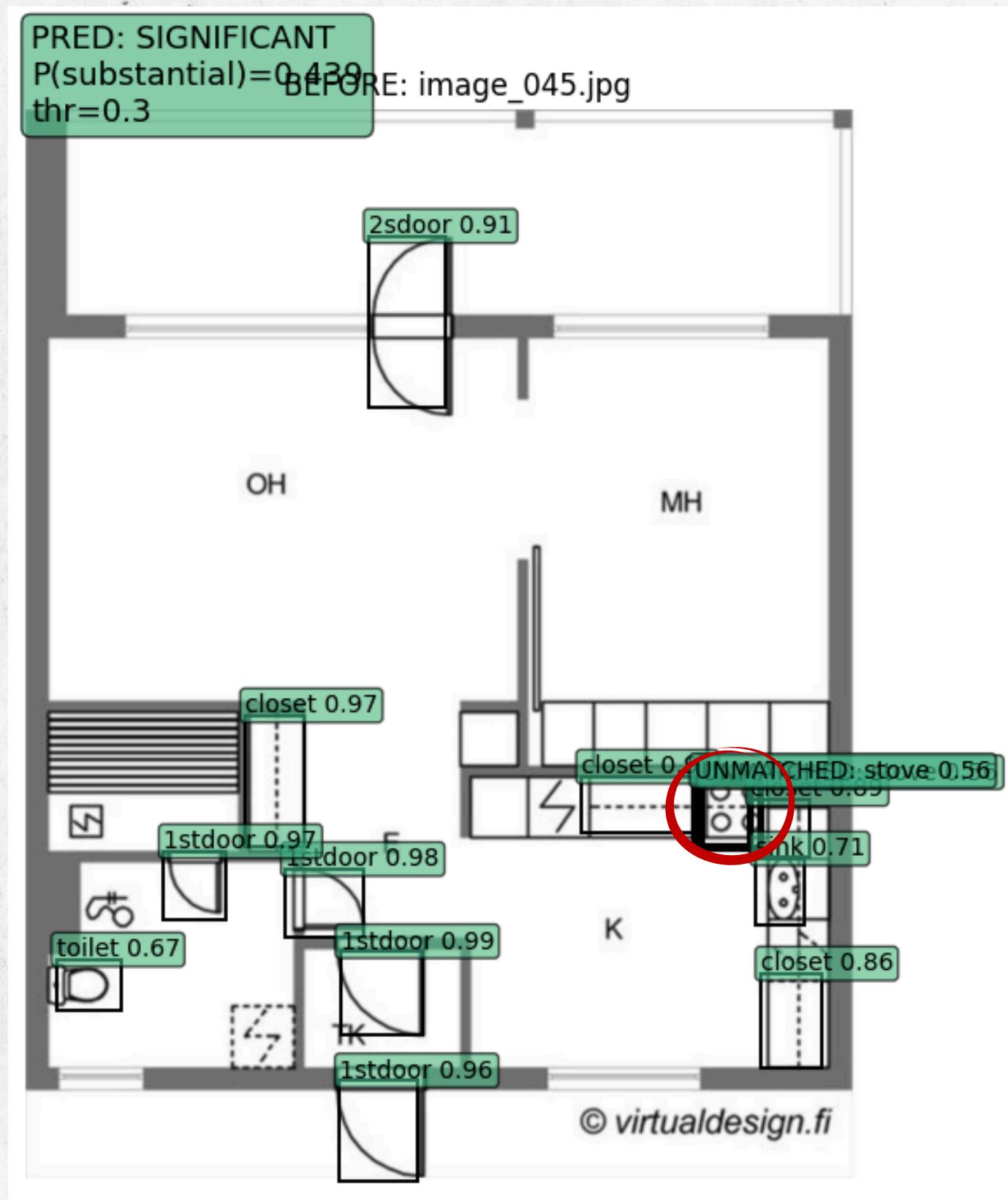
- Accuracy, Precision, Recall, F1-score
- Threshold sweep on prediction confidence
- Threshold = 0.3 selected for best performance on meaningful changes



CHANGE-TYPE CLASSIFICATION:

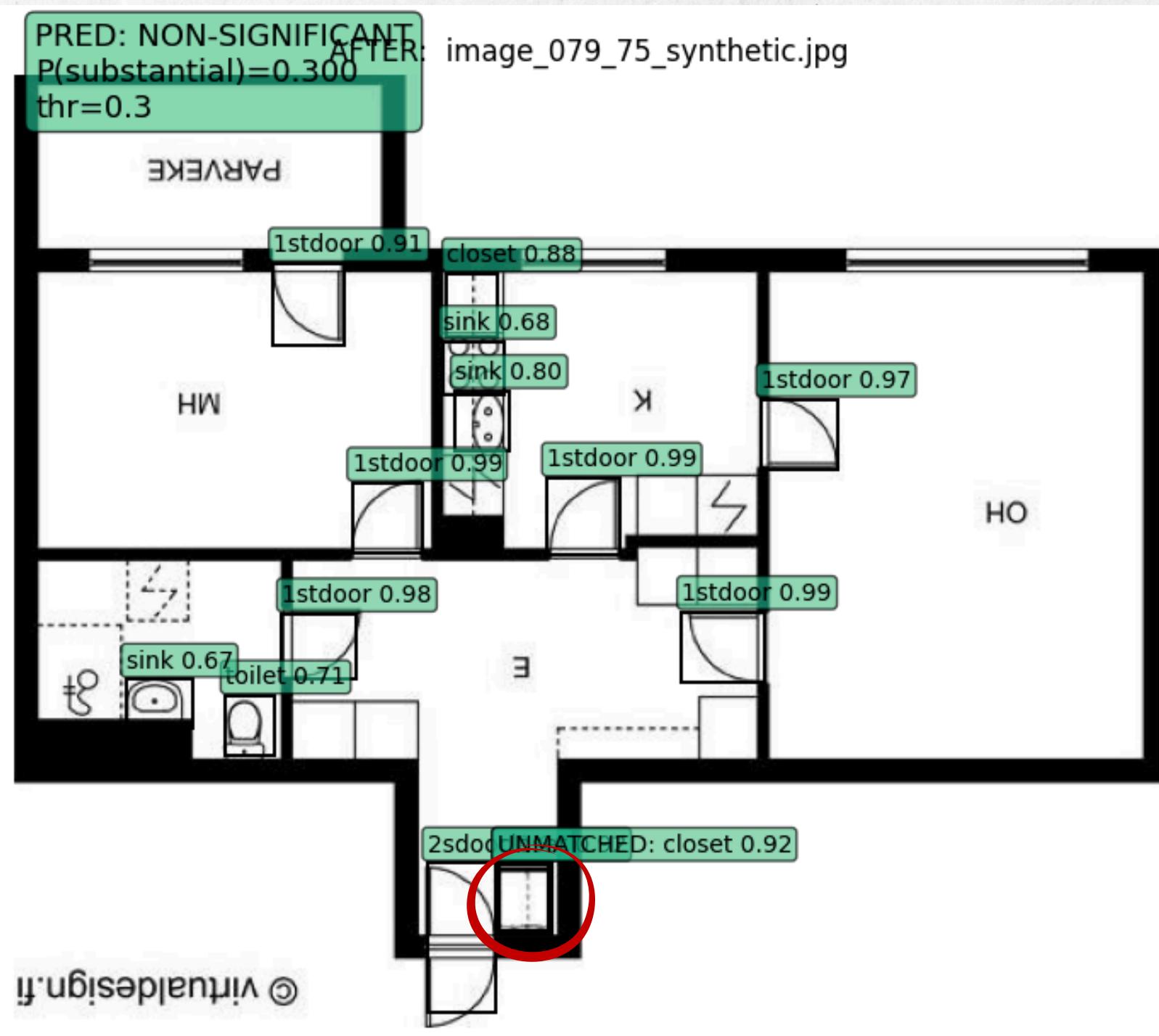
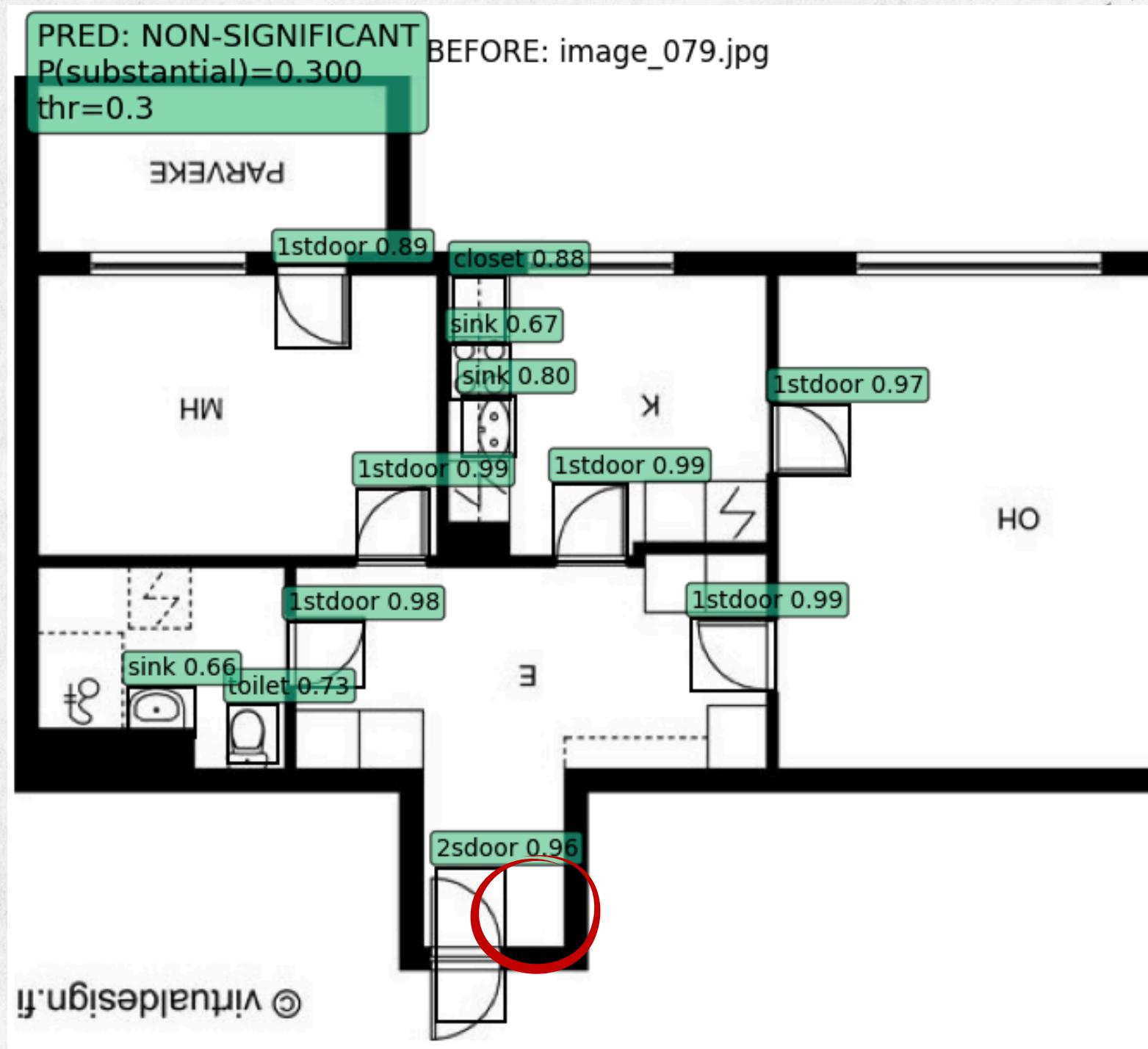
- DETR-based classifier with Hungarian Matching
- Feature Engineering produced by the Hungarian Matching
- Logistic Regression model
- Output: predicted change type between image pairs

predicted: significant ✓

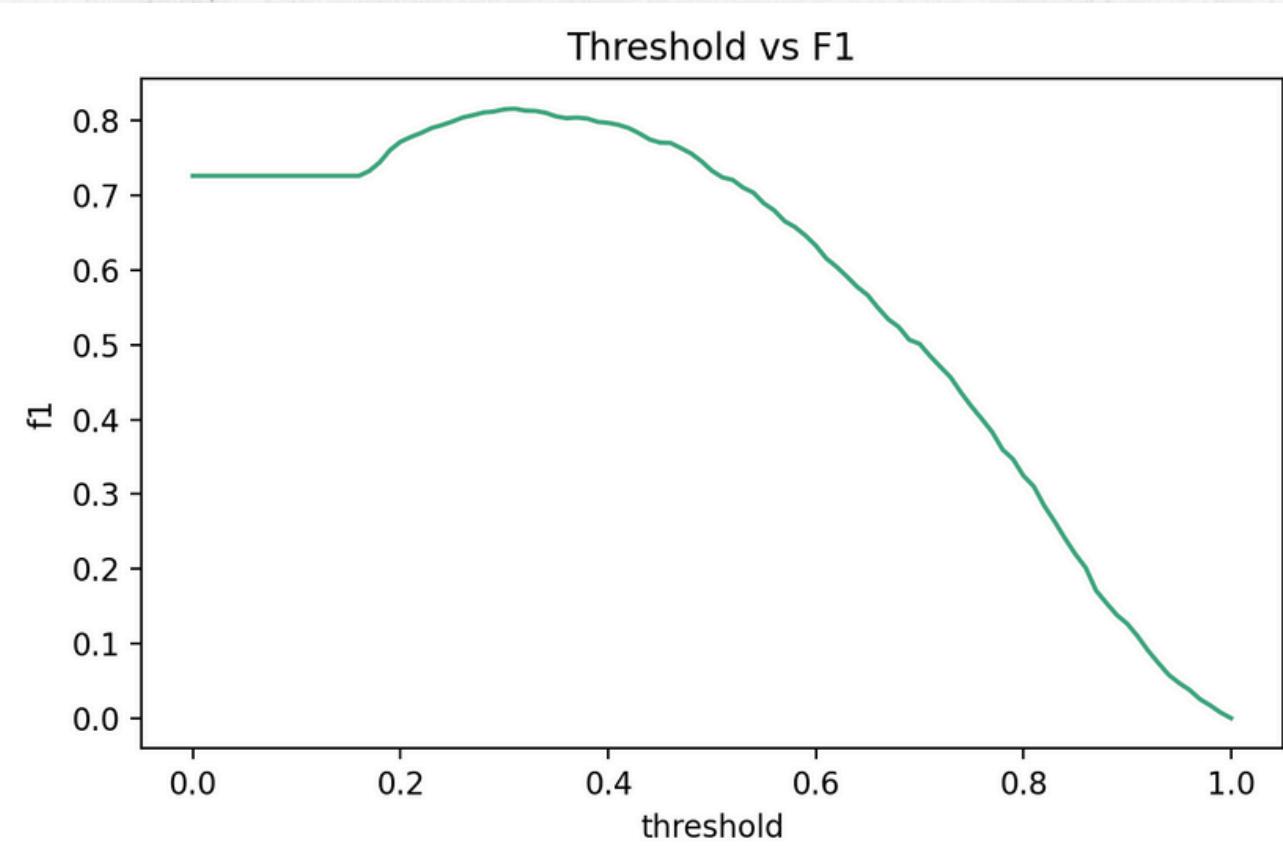


REMOVED STOVE

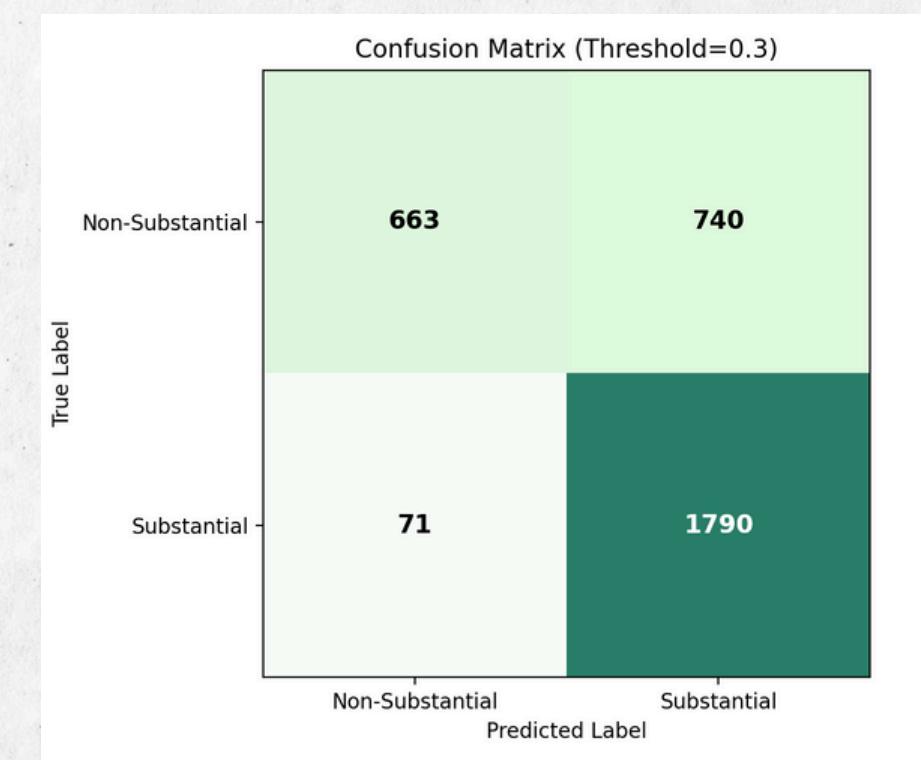
predicted: non-significant ✓



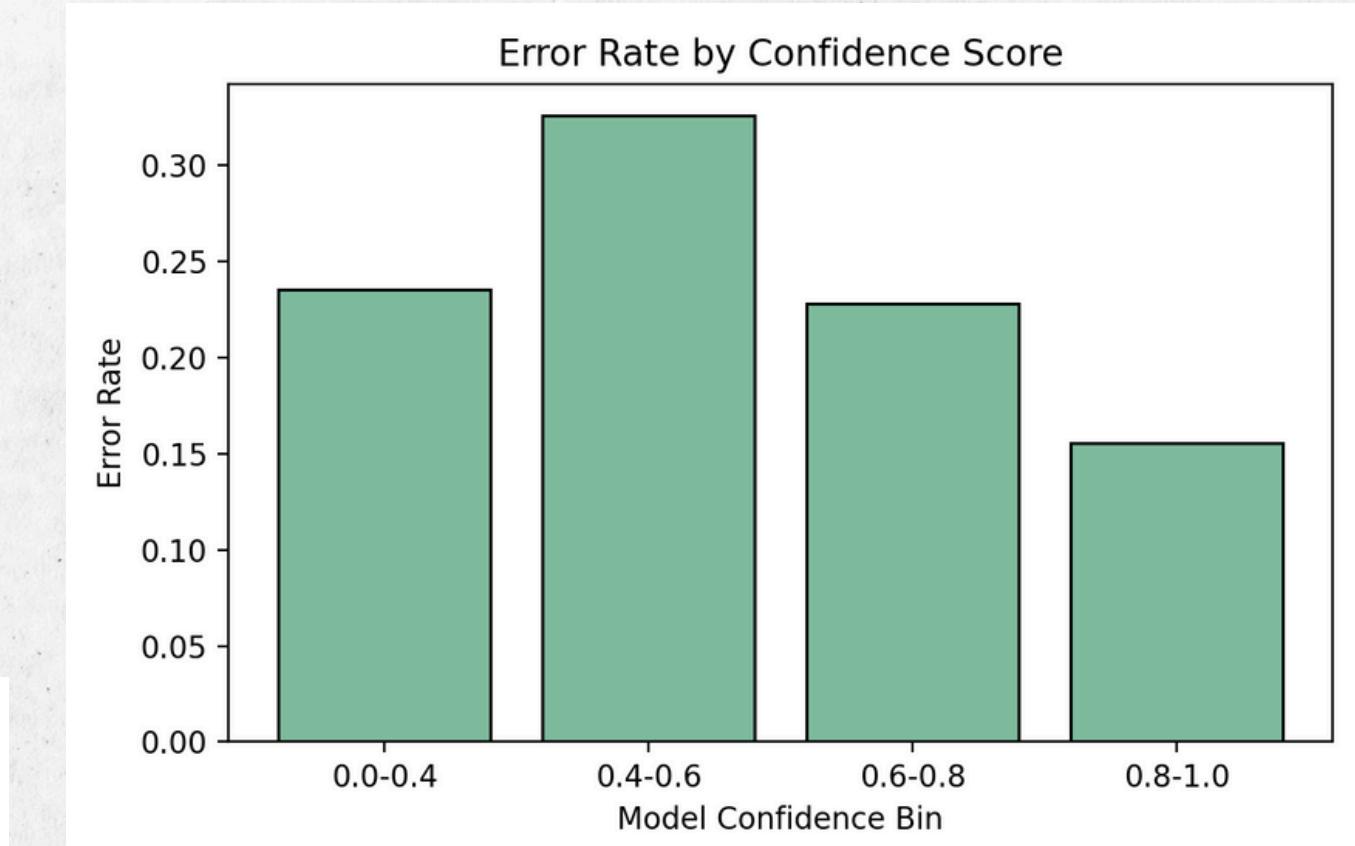
Results



THRESHOLD = 0.3 SELECTED FOR F1 SCORE
OF 0.81



HELPS ANALYZE FALSE POSITIVES AND FALSE
NEGATIVES.



HIGH-CONFIDENCE PREDICTIONS ARE
RELIABLE

Conclusion

SUMMARY:

- Detected meaningful changes in floor plan images
- Created a novel synthetic dataset where none previously existed
- Built a large labeled before/after image set

FUTURE WORK:

- Expand and refine change types and scenario complexity
- Combine synthetic and real-world data
- Use confidence to flag uncertain cases

KEY INSIGHTS:

- Data quality and change definition are more critical than model complexity
- Different models perform better for different change types
- Threshold selection has a strong impact on practical performance