

High-Level Feature Aggregation for Fine-Grained Architectural Floor Plan Retrieval

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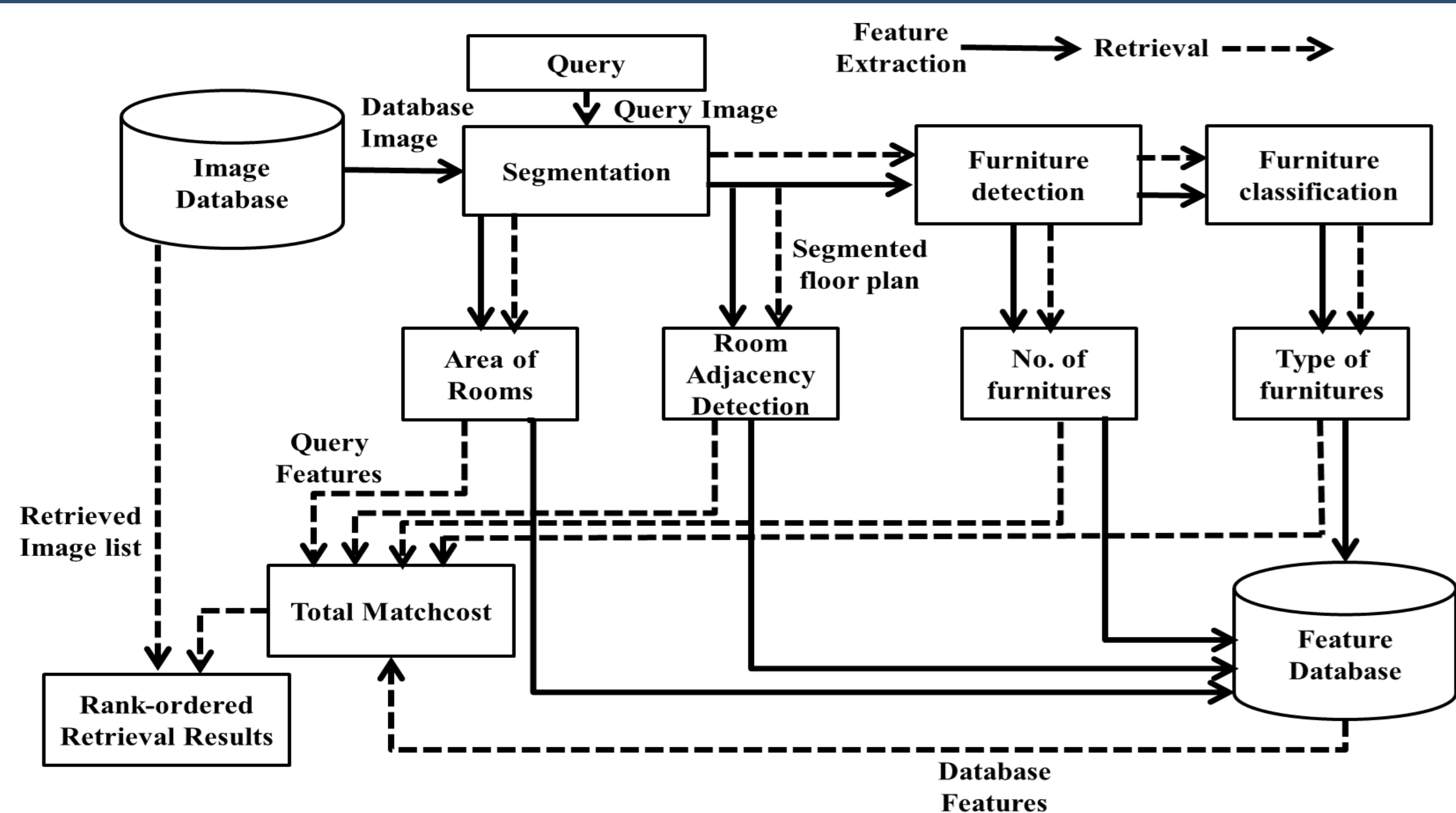
Introduction

- Provide automatic lookup to retrieve similar past architectural projects based on specific features.
- Extracting high-level semantic features like area and size of rooms, adjacent room details & room-wise furniture arrangement from floor plans.

Contribution

- A novel end-to-end framework for extracting high level semantic features like area and room-wise decor arrangement for the task of fine grained retrieval.
- Technique to perform feature fusion to aggregate high-level semantic features to retrieve floor plans.
- Weighted fusion gives liberty to set preference to certain features while retrieval.

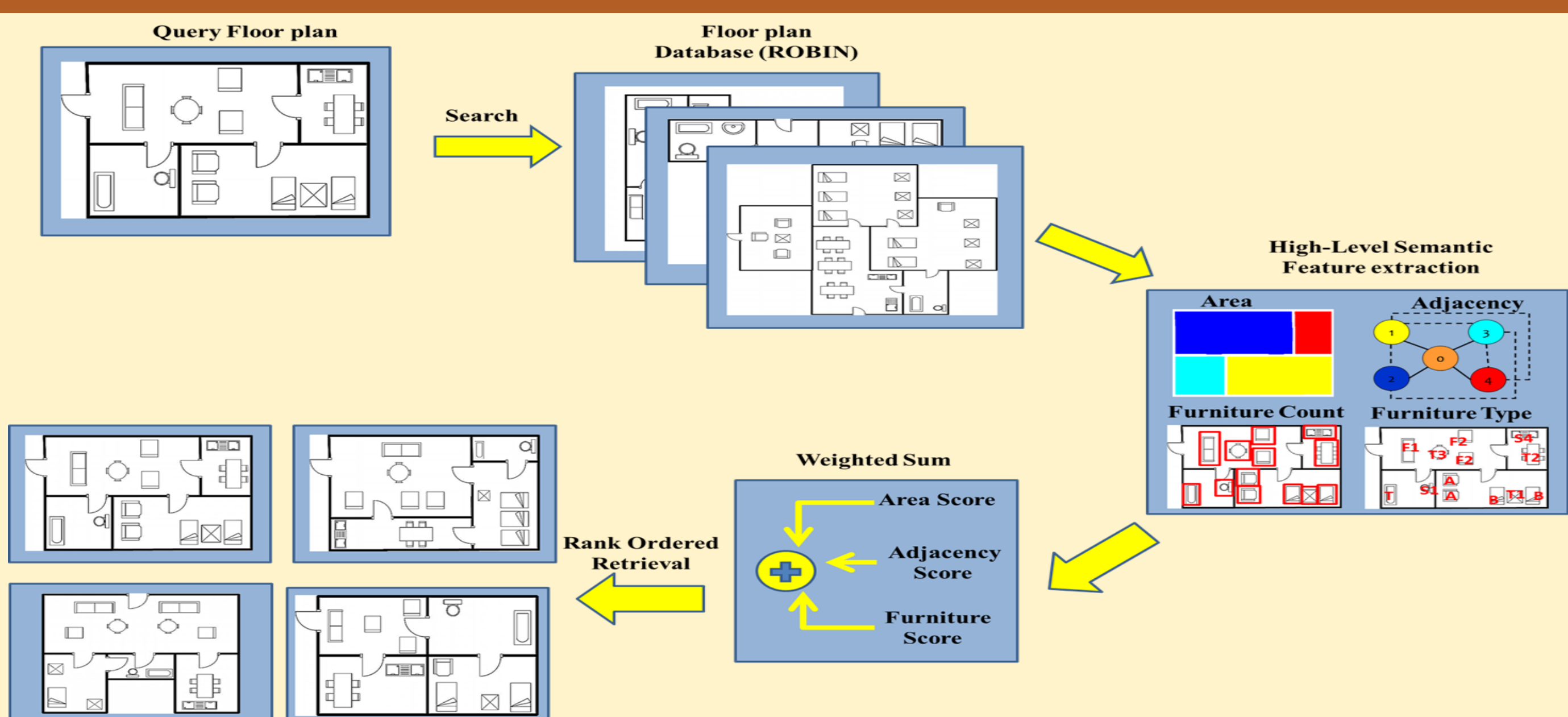
Framework Diagram



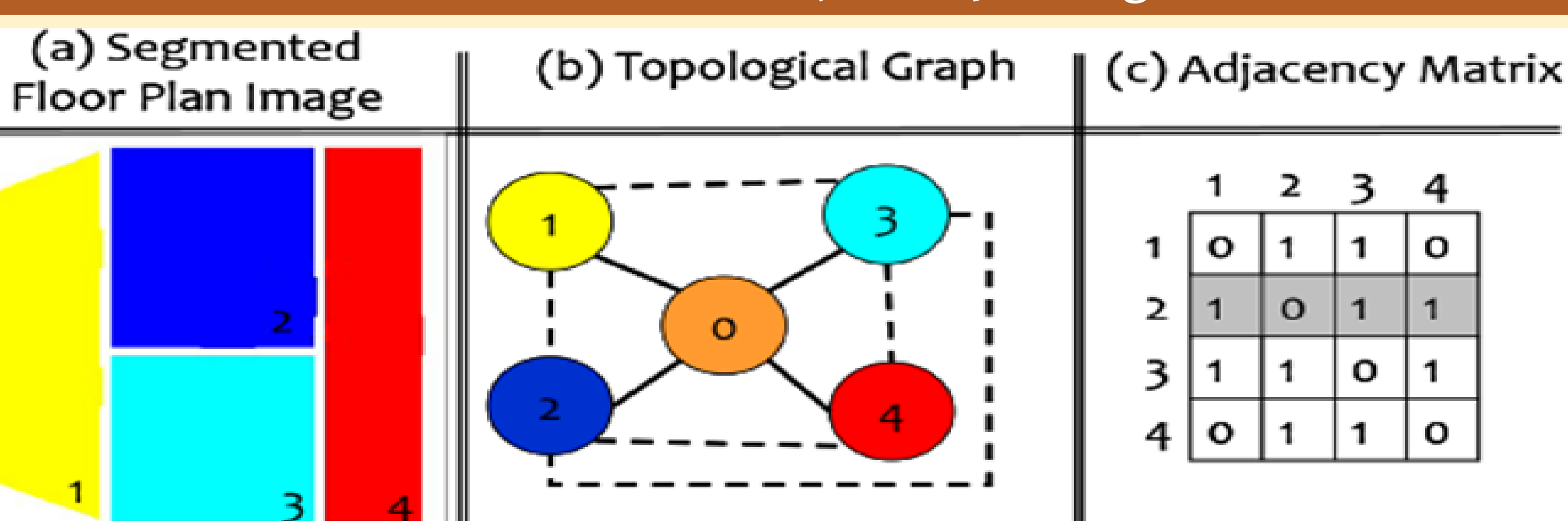
Related Work

- Symbol spotting in graphical documents: Dutta et al. 2011, 2013
- Sketch based retrieval of architectural floor plans: Weber et al. 2013
- Room detection in architectural floor plans: Ahmed et al. 2012

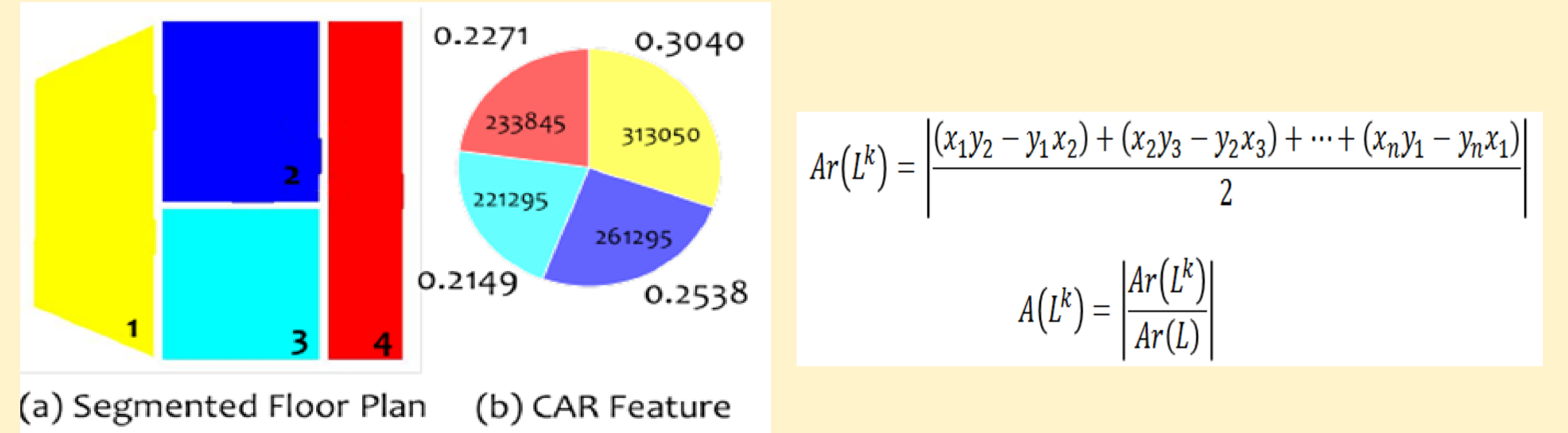
High Level Feature Aggregation



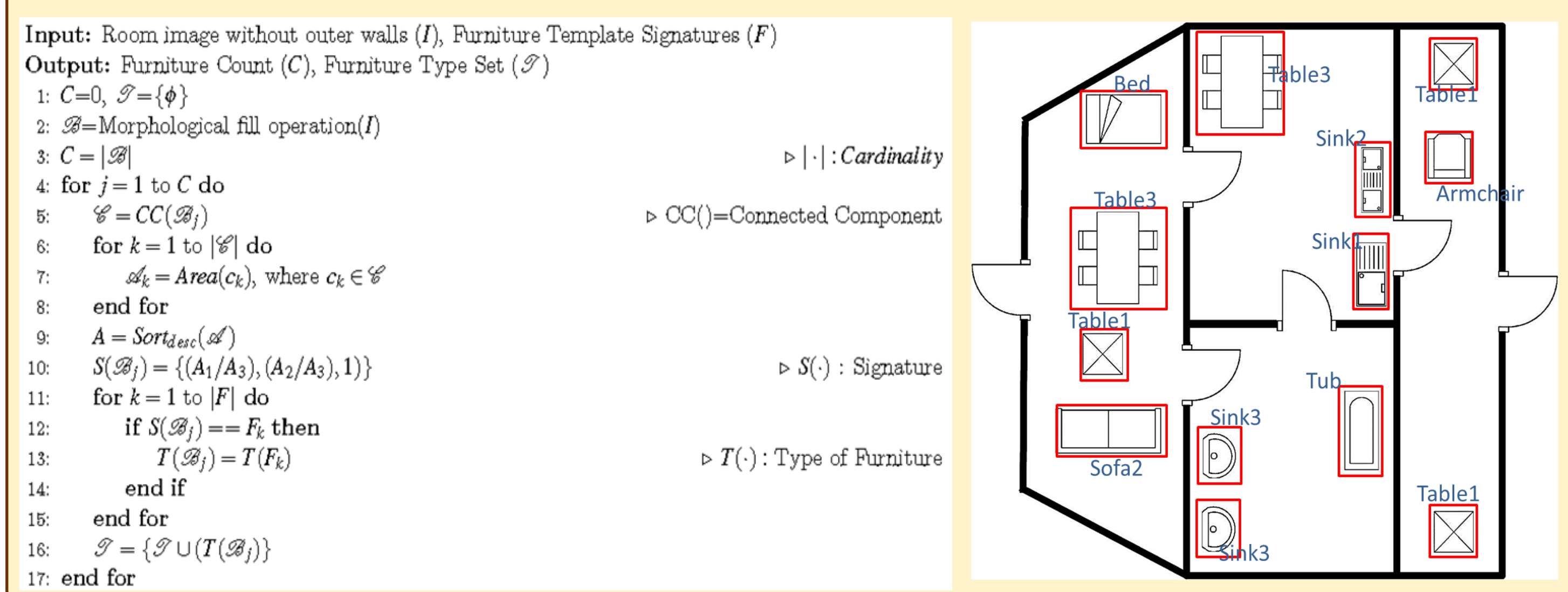
Feature 1: Room Adjacency String



Feature 2: Carpet Area Ratio



Feature 3: Furniture Composition Record



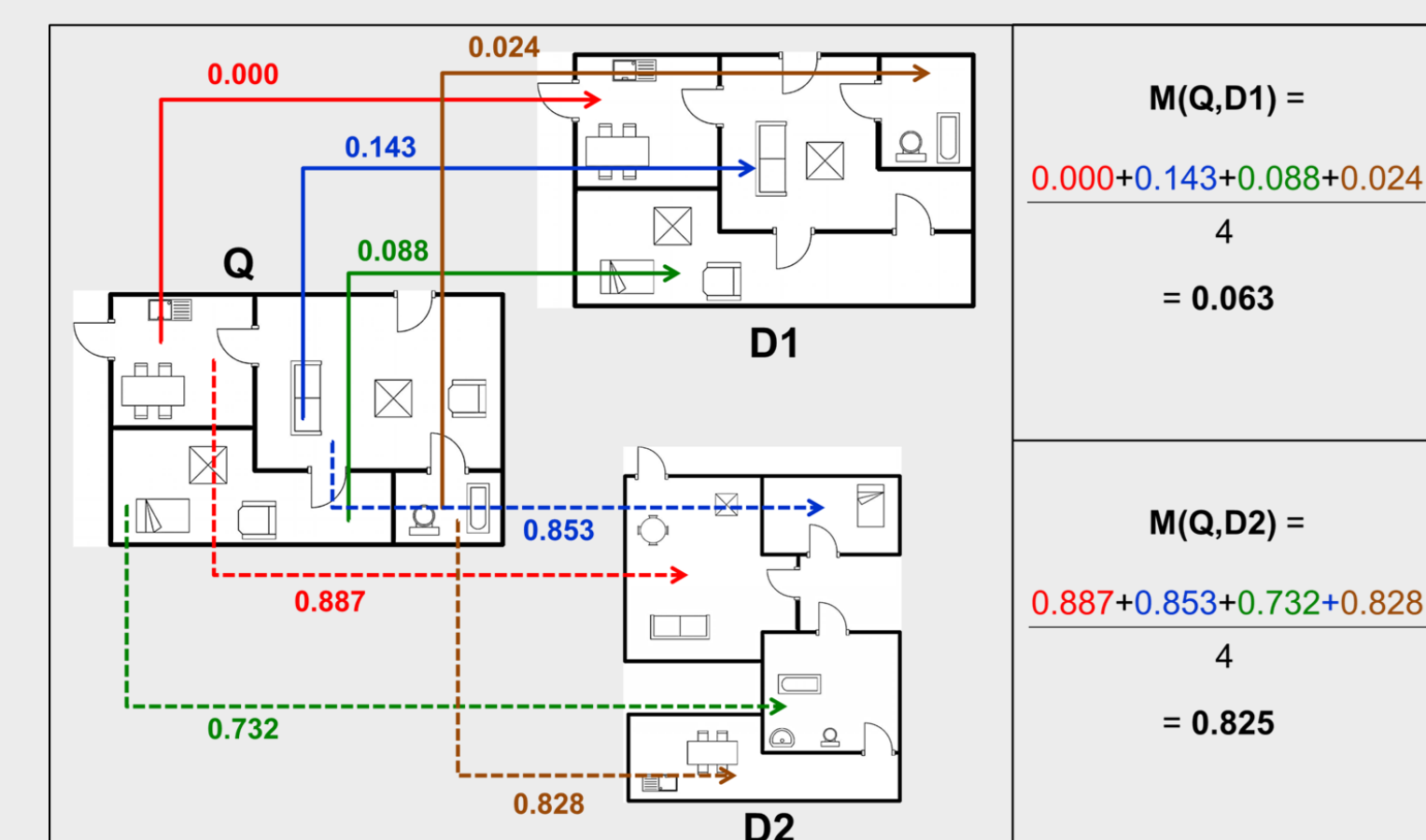
Total Match Score

$$M(i, j) = 1 - \frac{\eta_1 \rho^+(i, j) + \eta_2 \phi^+(i, j) + \eta_3 \theta^+(i, j) + \eta_4 \theta^+(i, j)}{4}$$

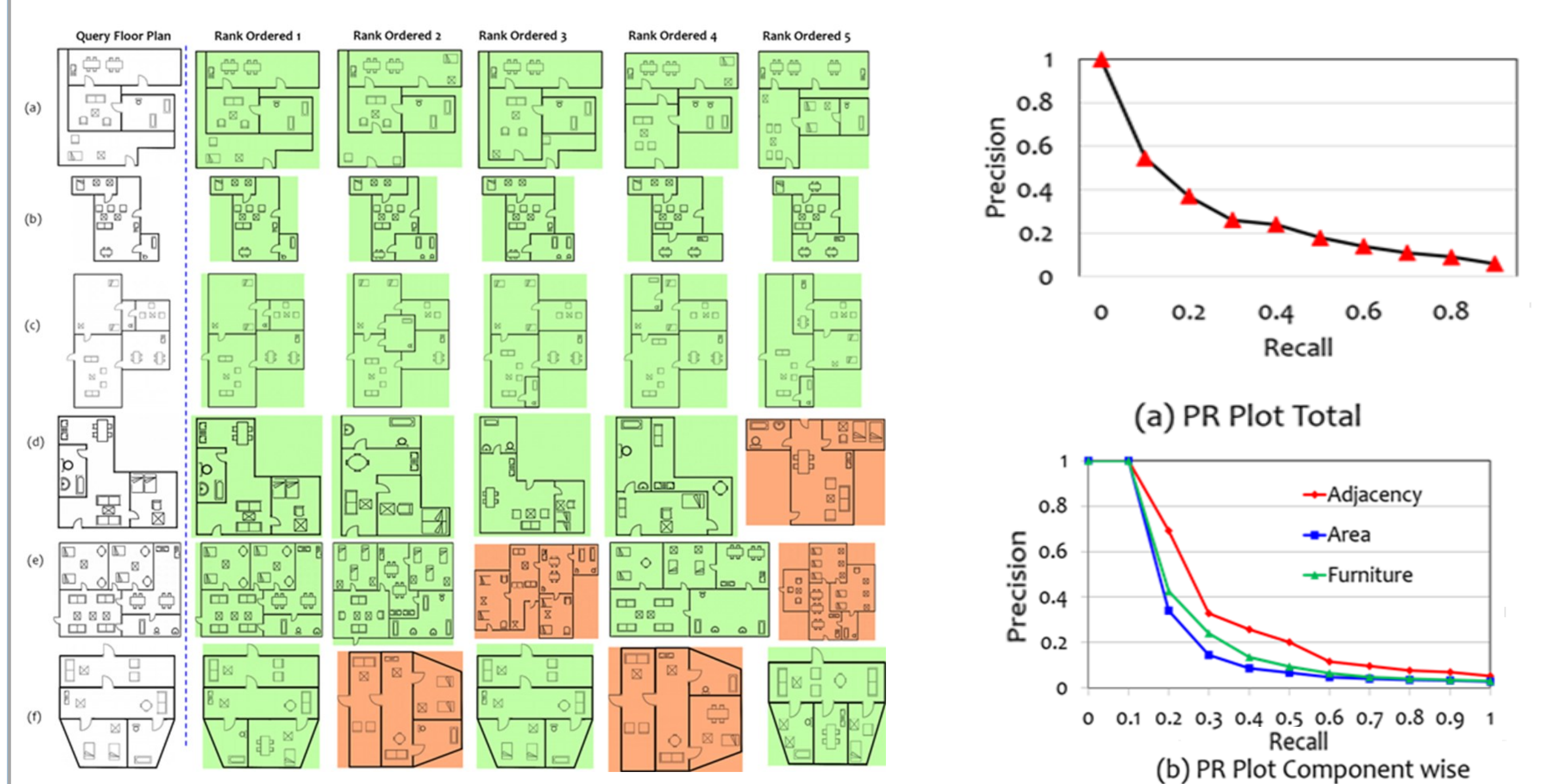
Weight Coefficient

Normalising in the Range [0,1]

ρ → Room Adjacency String
 ϕ → Carpet Area Ratio
 θ → Number of Furniture
 θ → Type of Furniture



Total Match Score



Conclusions

- A framework for fine grained retrieval of floor plans using high level semantic features like area, number, type of furniture and also adjacencies between the rooms.
- Giving liberty to users/architects to set preference to particular features while retrieval.
- Sketch based query makes a good case for future scope.