# Physics Inspired Optimization on Semantic Transfer Features:
## An Alternative Method for Room Layout Estimation

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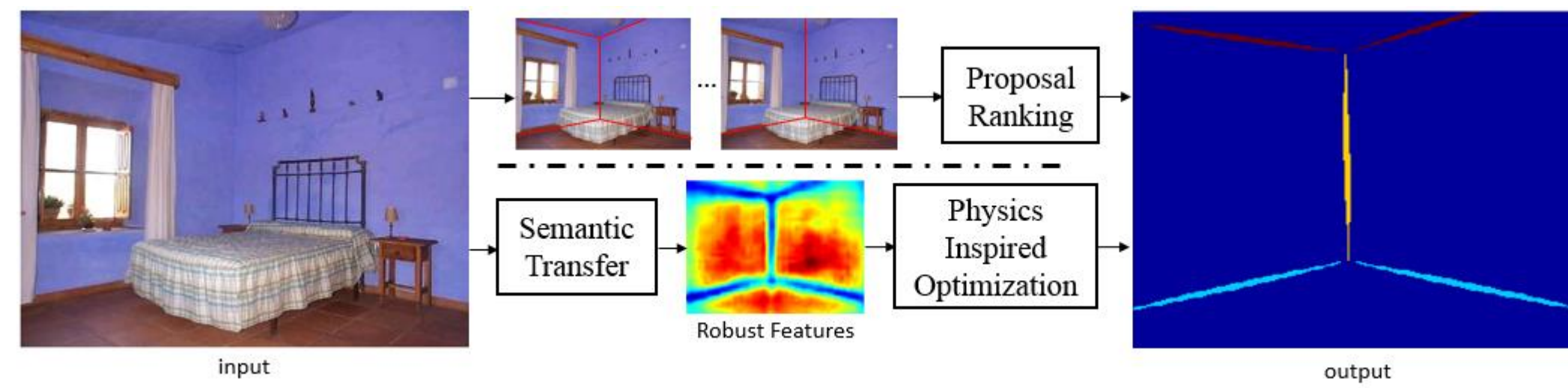
Tsinghua University

## Introduction

➢ This is a room layout estimation method featured by:

  (1) Semantic Transfer;

  (2) Physics Inspired Optimization

➢ PIO's basic idea is to formulate some phenomena observed in ST features into mechanics concepts.
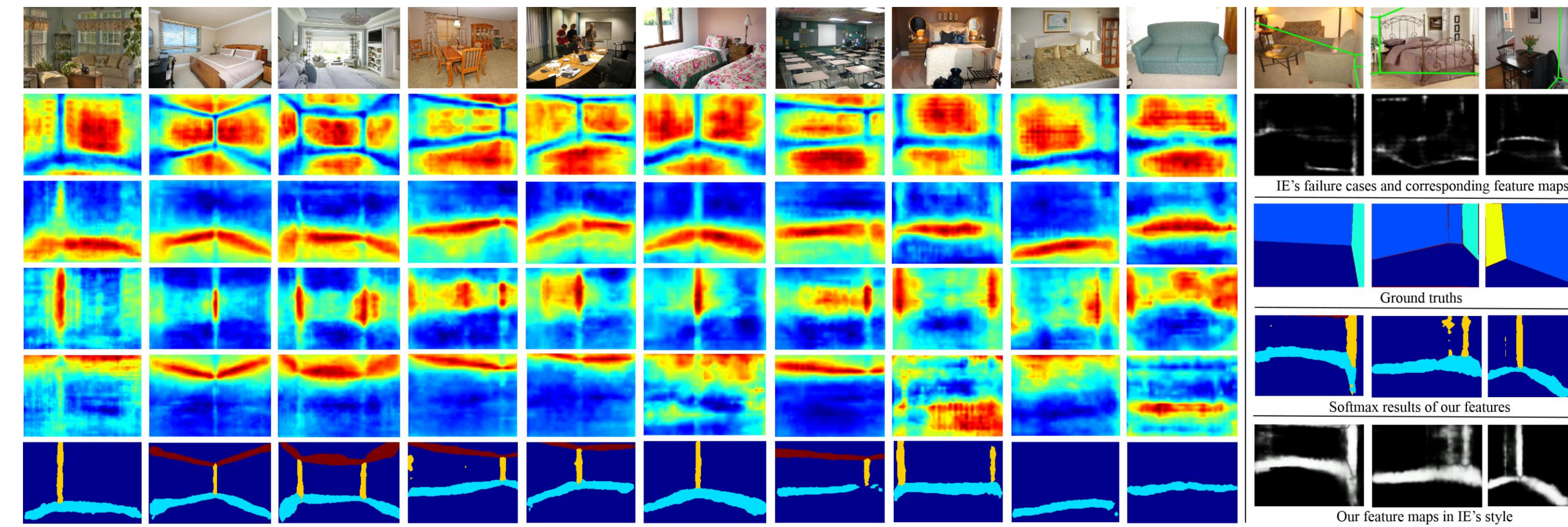


## Semantic Transfer

➢ As a discriminative model, it integrates the relationship between room layout and scene clutter into an FCN;

➢ As an architecture, it enjoys the benefit of end-to-end training;

➢ As a training strategy, it provides better network initialization and allows us to train a very deep network under unbalanced data distribution;
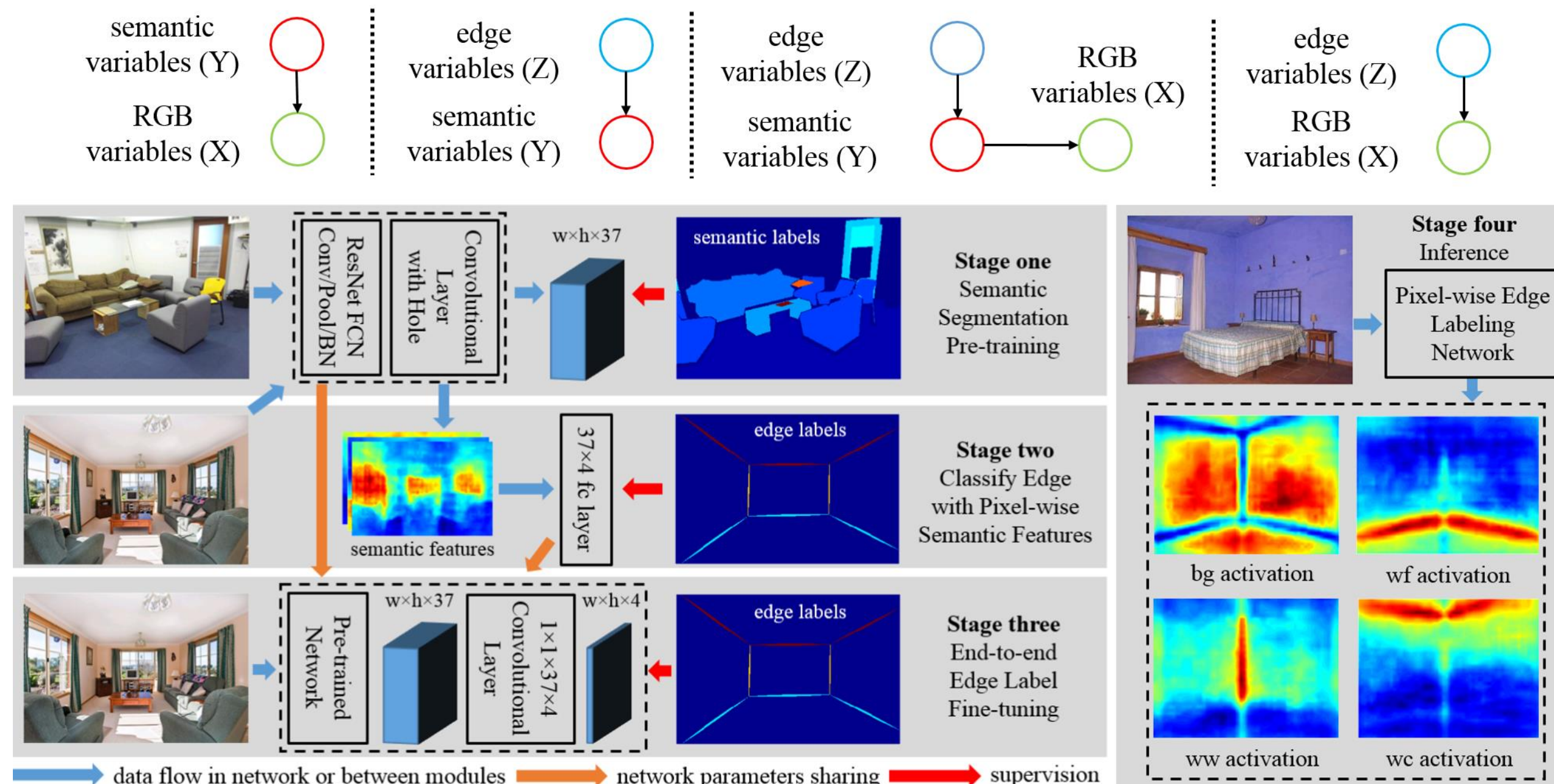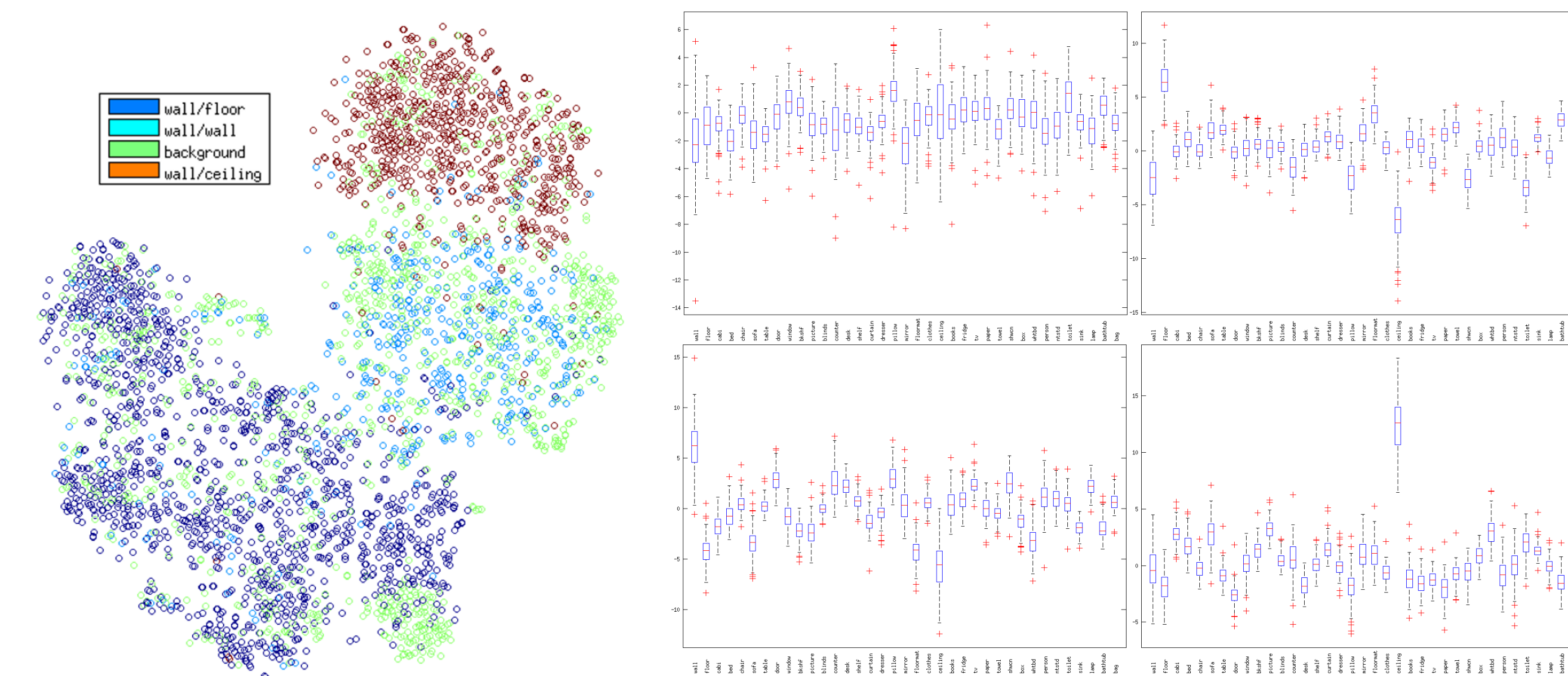


## Feature Quality Visualization

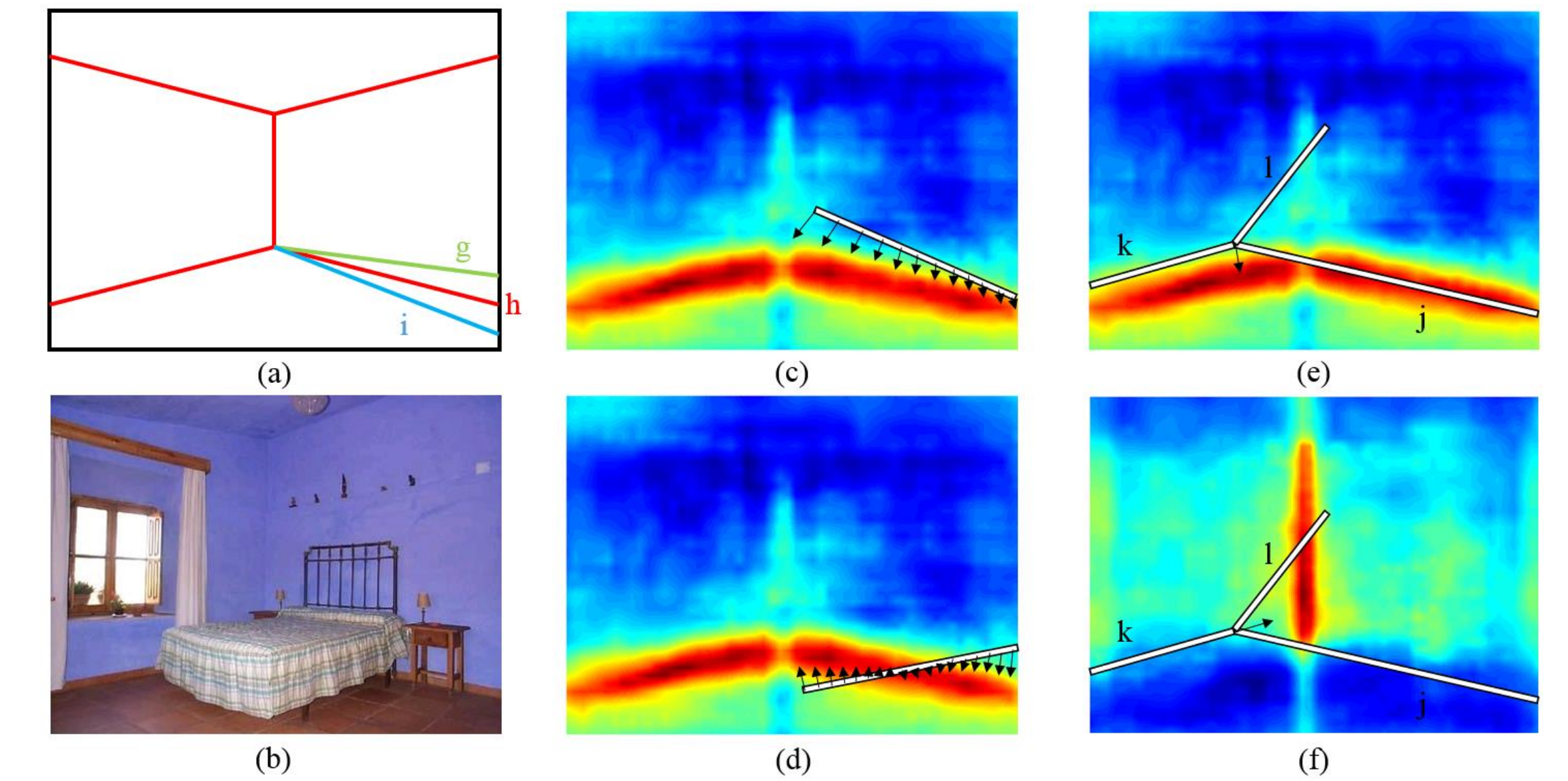➢ This figure illustrates that STN extracts reliable features under various circumstances:



## More about Semantic Transfer

➢ Feature embedding visualization;

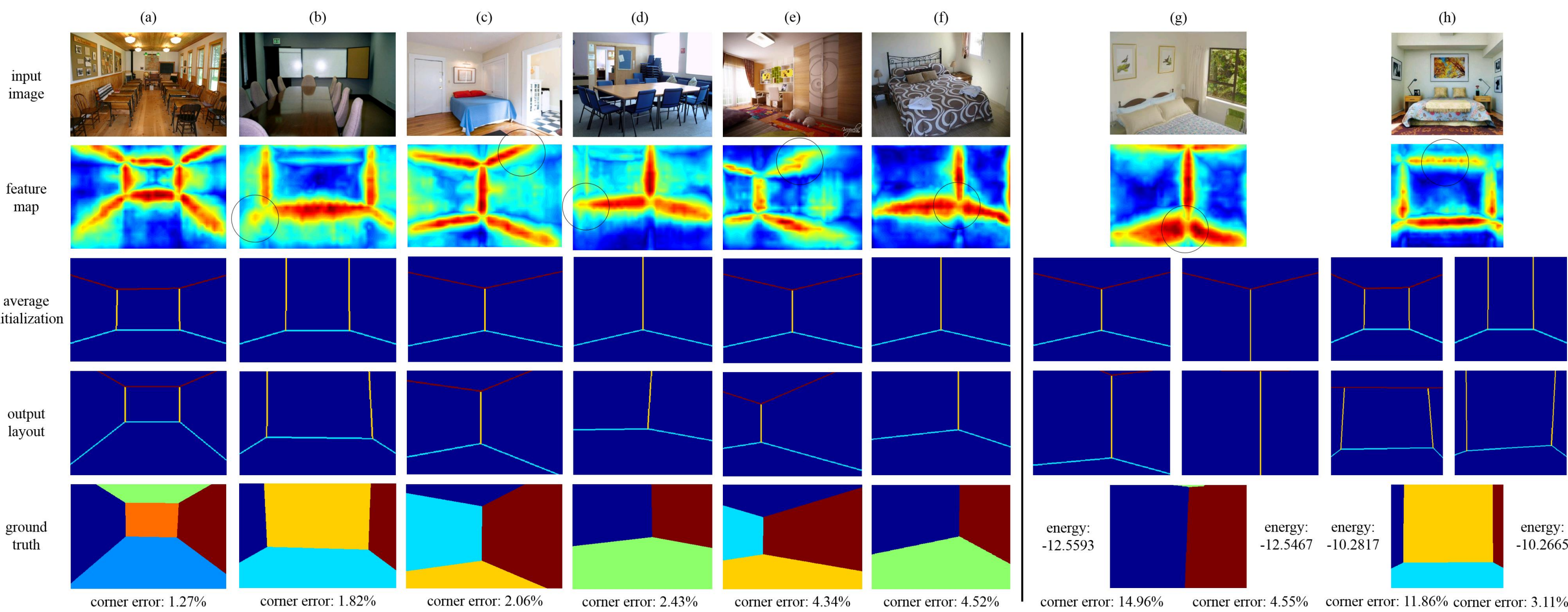➢ Transfer weights visualization;



## Physics Inspired Optimization

➢ The two core concepts behind PIO: Approximation and Composition



## Results

➢ Qualitative results on LSUN test (with videos):



➢ Quantitative results:
http://lsun.cs.princeton.edu/leaderboard/index_2016.html#roomlayout

**https://sites.google.com/view/st-pio/**