Solution for Homage Scene-graph Generation

Aixi Zhang[1*], Yue Liao[2*], Yongliang Wang[1], Miao Lu[1], Xiaobo Li[1], Si Liu[2]

[1]Alibaba Group, [2]Beihang University

[*]Equal contribution

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Outline

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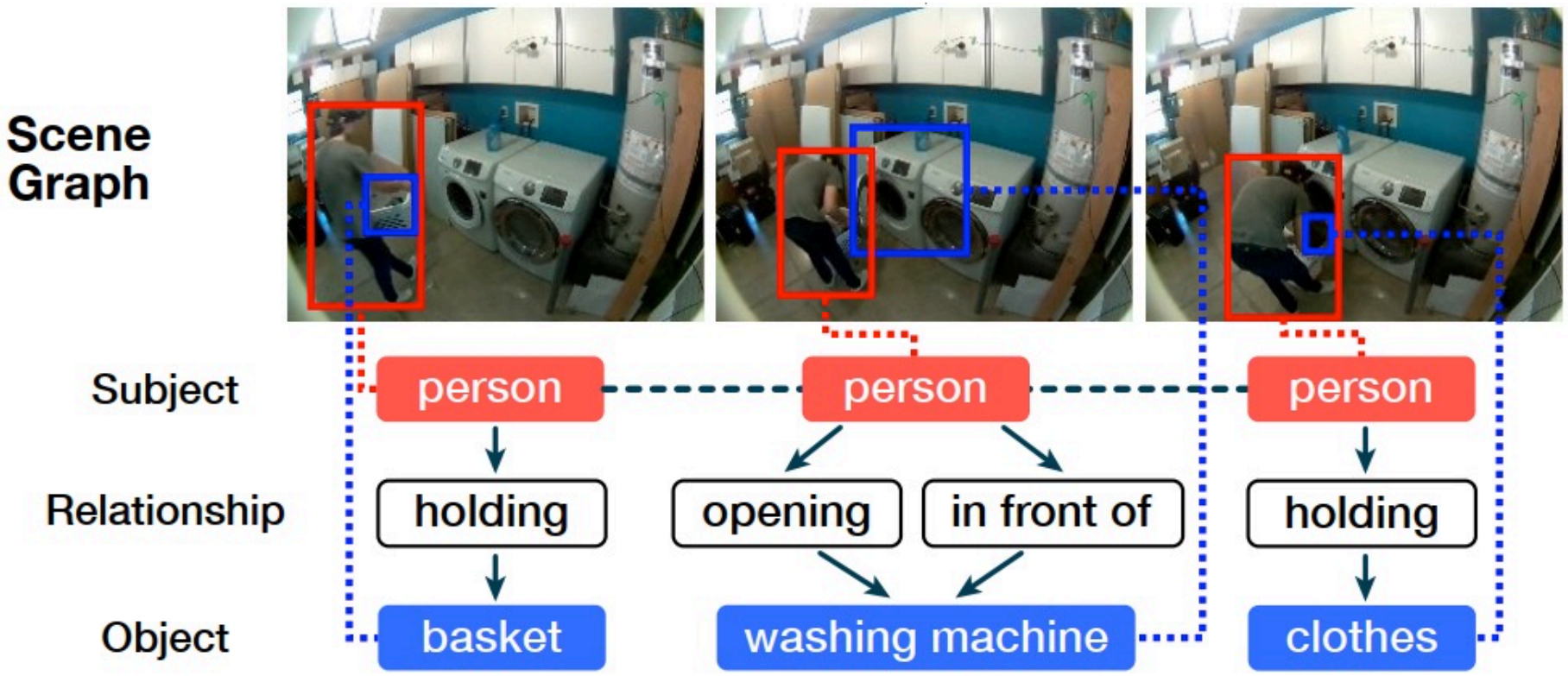
- Task Analysis
- Our Solution
- Experimental Results
- Summary

Homage SGG Task Analysis

Task Description：

Predict per-frame scene graphs to describe the relationship between a person and the object used during the execution of an action, as well as how they change as the video progresses



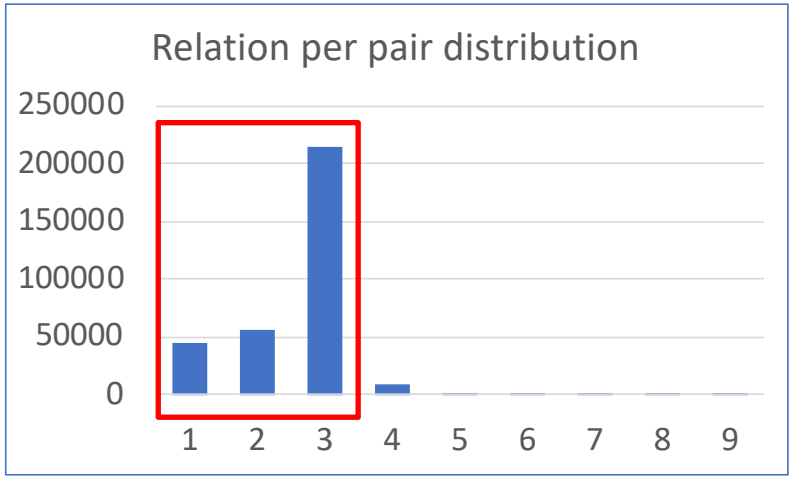
Home Action Genome: Cooperative Compositional Action Understanding, CVPR 2021

Homage Database Analysis

Database Description：

A large-scale multi-view video dataset of daily activities at home

Valid video num: 2,560
Valid frame num: 116,200
Pair labels num: 396,152, Pair per frame: 3.4
Relation labels num: 992,698, relation per pair: 2.5
Proportion of 1-3 relations per pair is 96.5%



Object class num: 84, imbalance factor: 115.7 (42,819 / 370)
Relation class num: 25, imbalance factor: 20,164.5 (241,974 / 12)

We randomly sample 400 video as our validation subset, for following experiments.

Algorithm Modules

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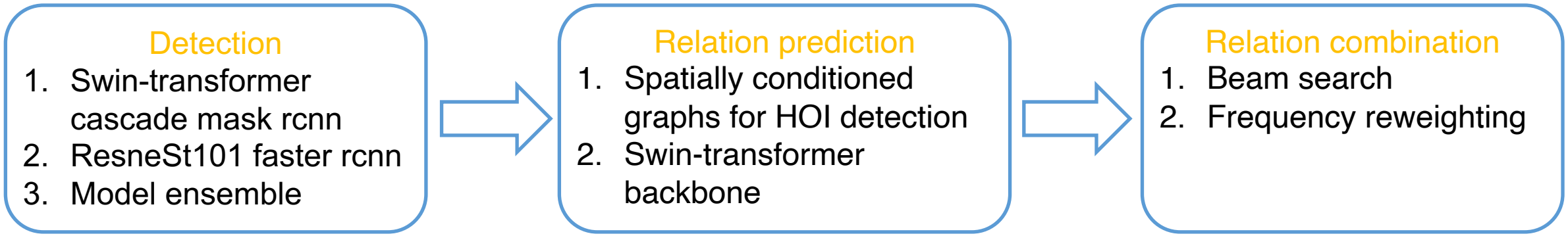
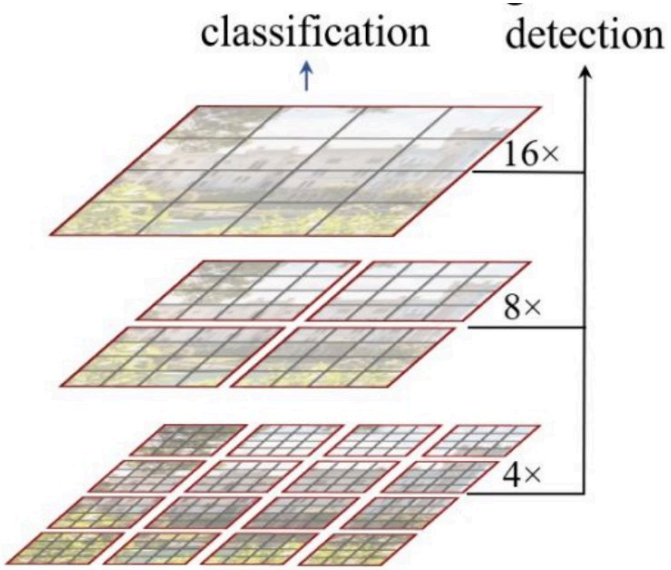
Three stage algorithm flow：

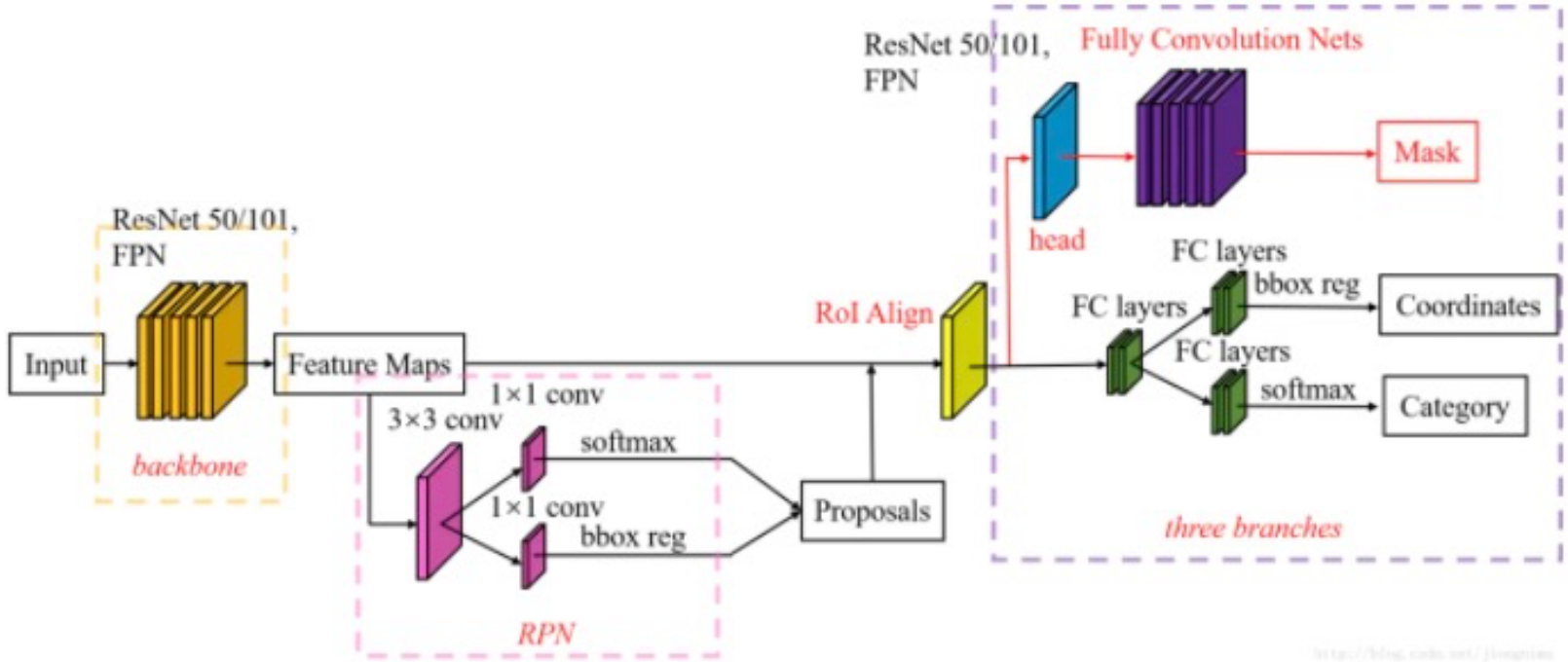


Detection

Swin-transformer backbone



Mask Rcnn pipeline



Detection

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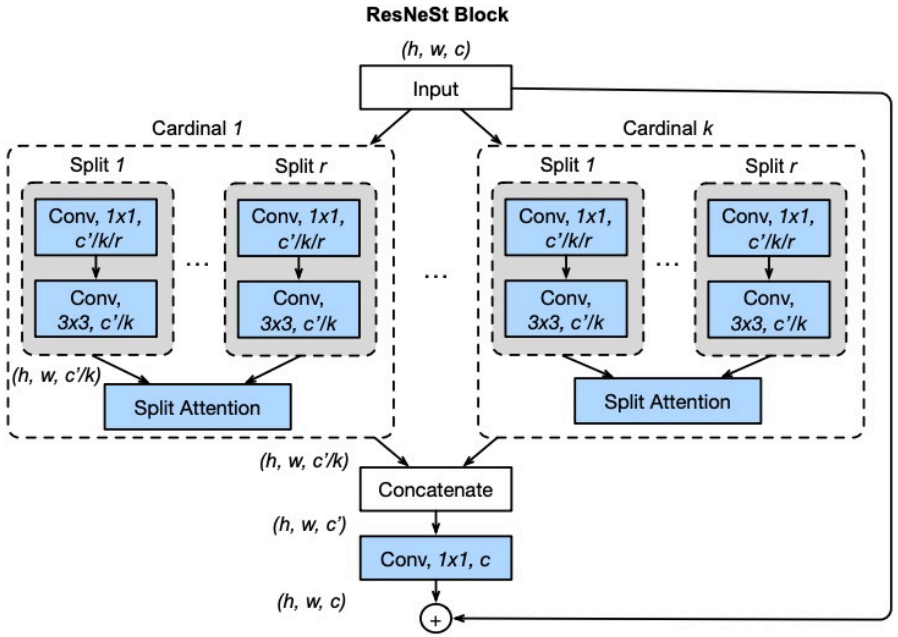
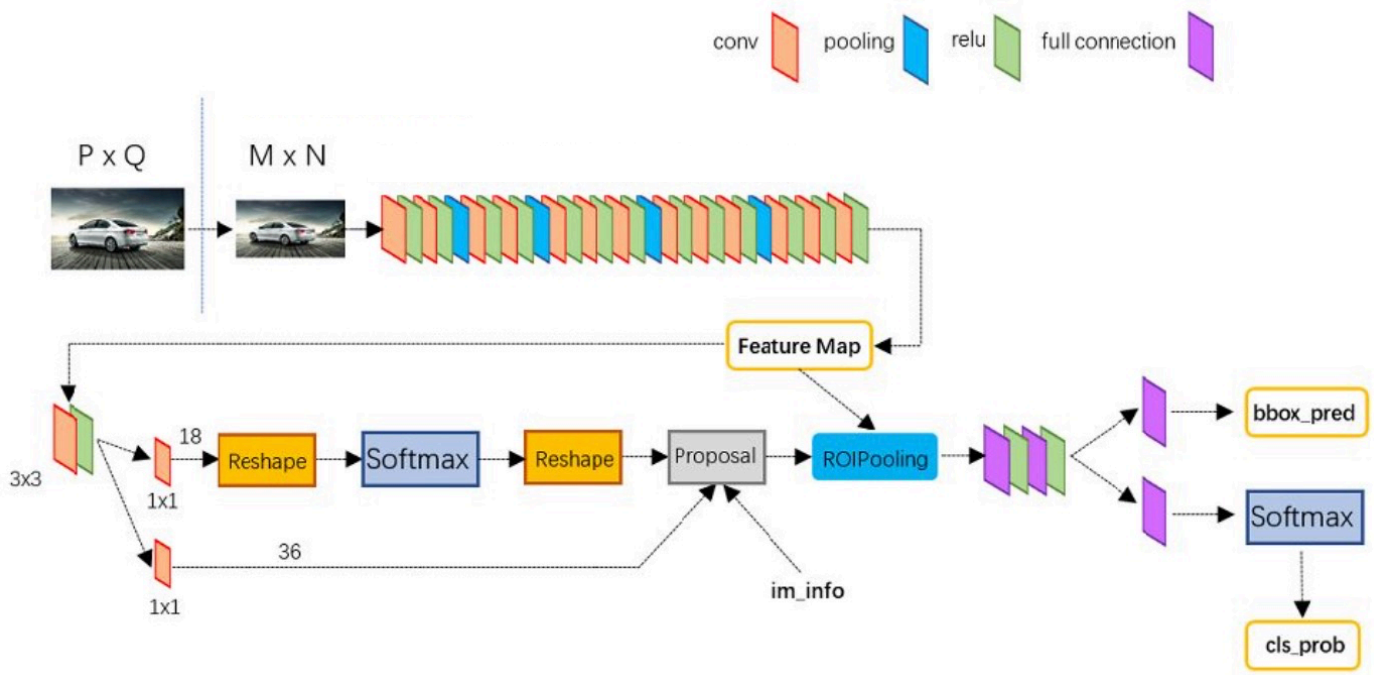
ResNeSt backbone



Faster RCNN pipeline



Detection Results

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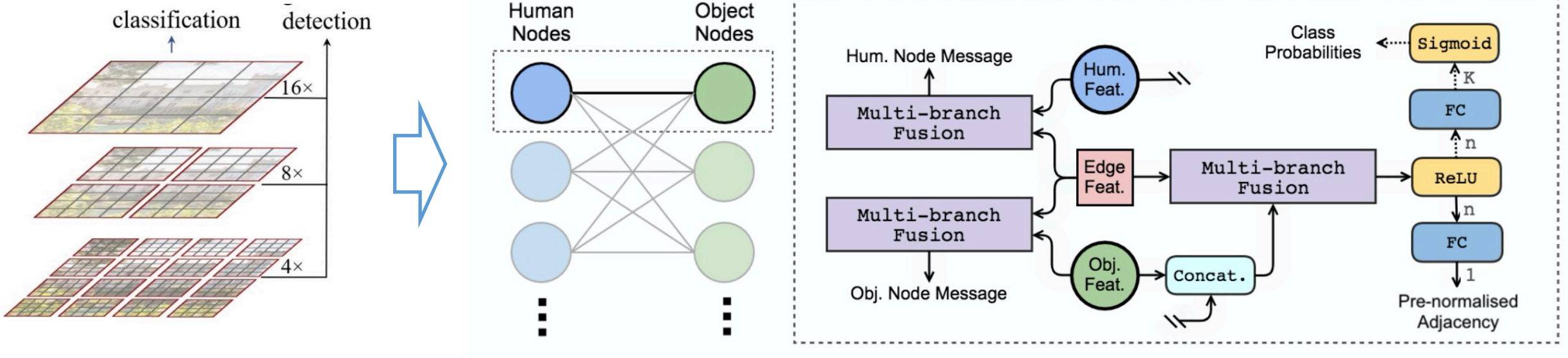
Methods	Description	Accuracy (%)
1	Swin-B	81.70
2	Multi-scale Swin-B	83.40
3	ResNeSt101	79.95
4	Multi-scale ResNeSt101	80.64
5	Merge 2 & 4	84.65

Relation Prediction

Swin-Transformer based spatially conditioned graph architecture for HOI detection



Spatially Conditioned Graphs for Detecting Human–Object Interactions, 2021

Relation Prediction Results

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Evaluation results on our validation subset.

Methods	Description	Score (%)	Recall@10	Recall@20
1	On swin-transformer only detections	69.4	65.8	73.0
2	On merged detections	73.1	69.6	76.7
3	With frequency promotion	78.6	74.9	82.3

Finally, we get 76.57% accuracy and rank the first place.

Summary

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- Design a three-stage algorithm flow for the Homage scene graph generation task
- Apply Swin-Transformer based SCG model for the task
- Achieve the first place in the Homage scene graph generation challenge

Thanks!