

Scene Graph Expansion for Semantics-Guided Image Outpainting

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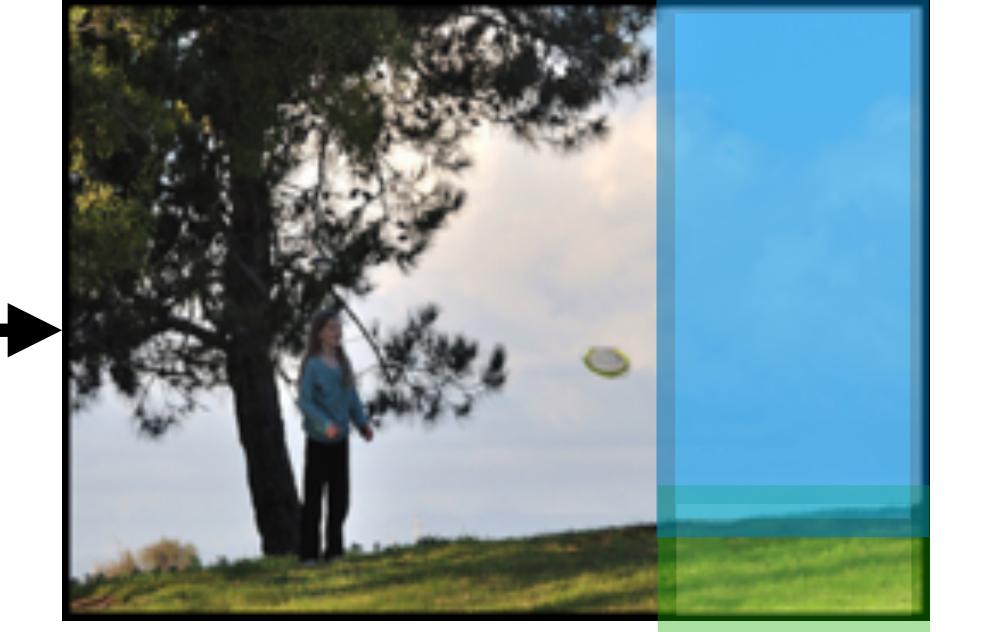
Introduction

• Image Outpainting

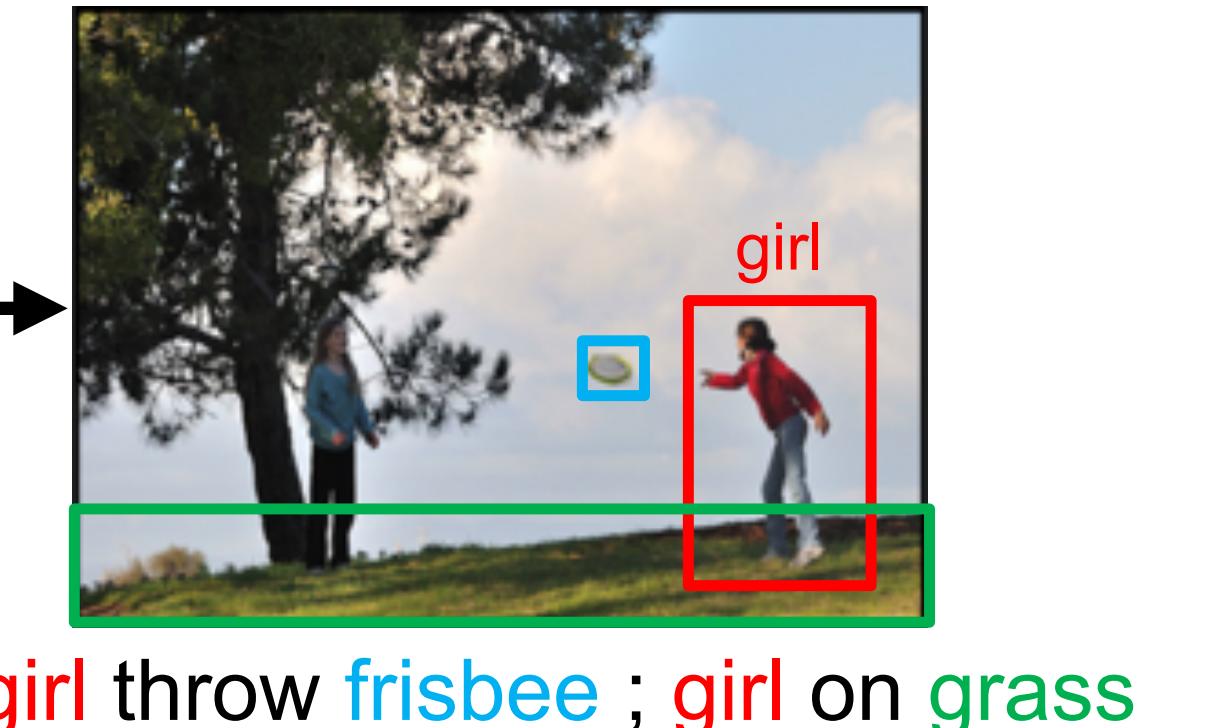


• Motivation

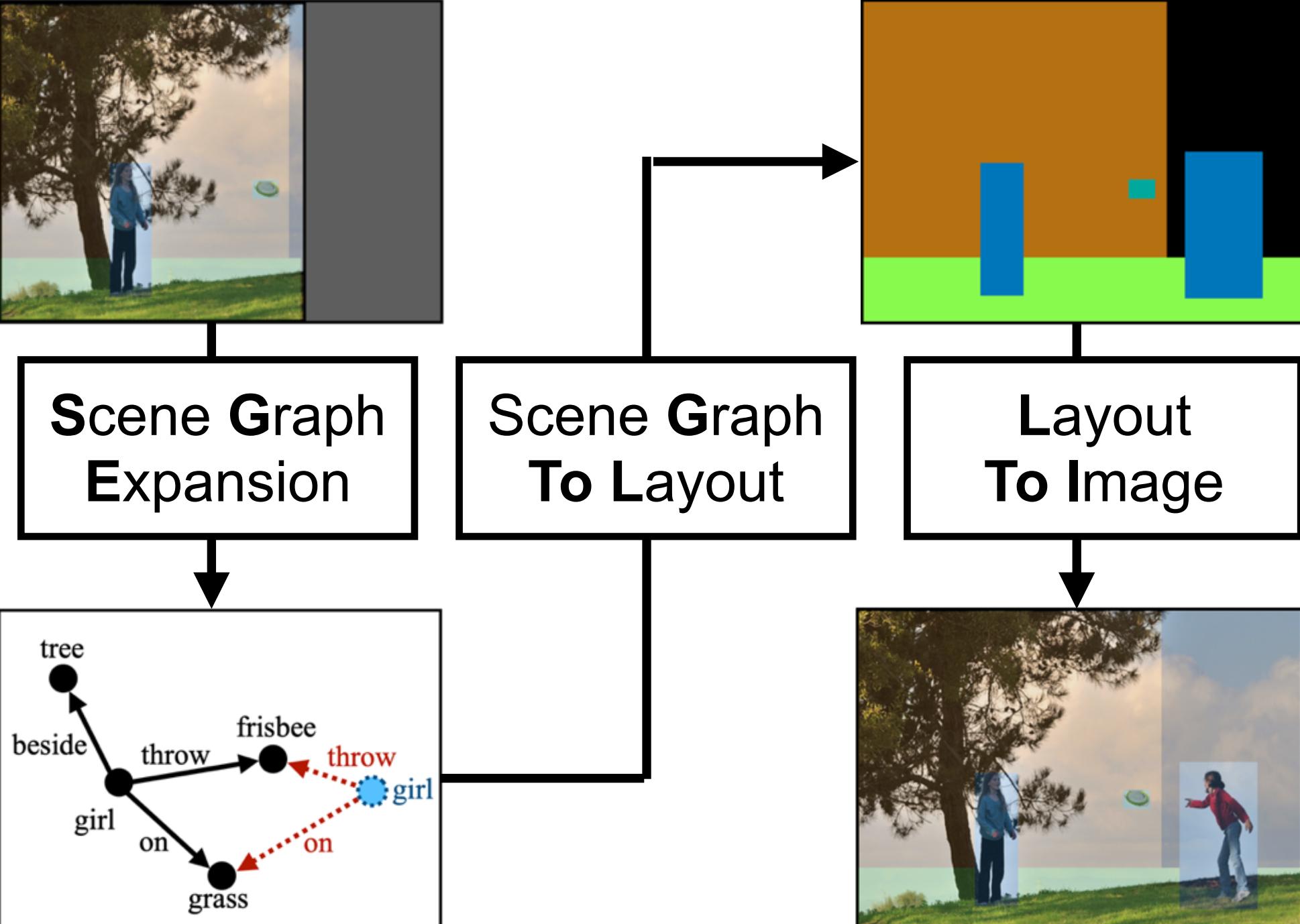
(1) Traditional Outpainting



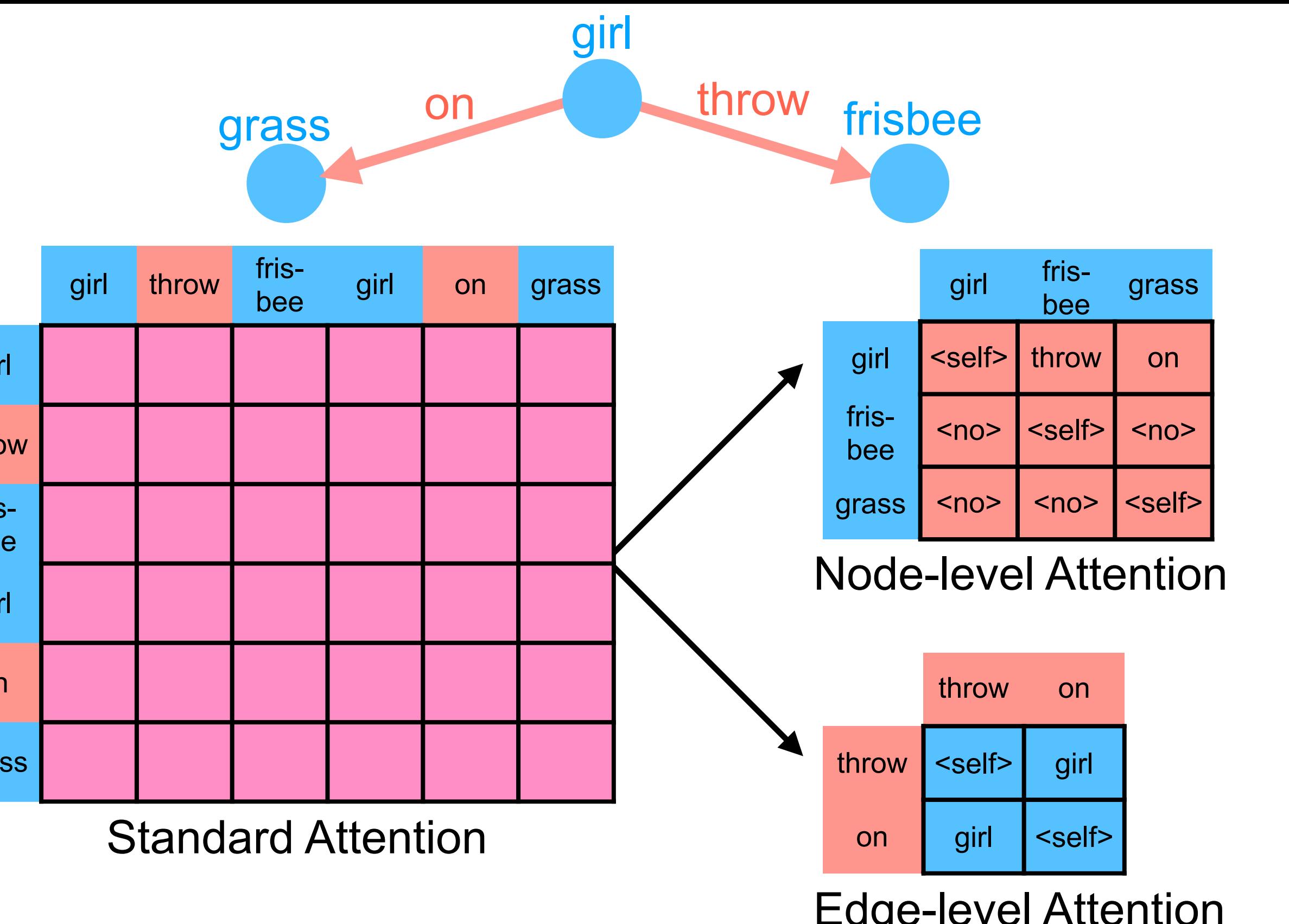
(2) Ours: generate novel object(s) with reasonable relationships



• Semantic-Guided Image Outpainting

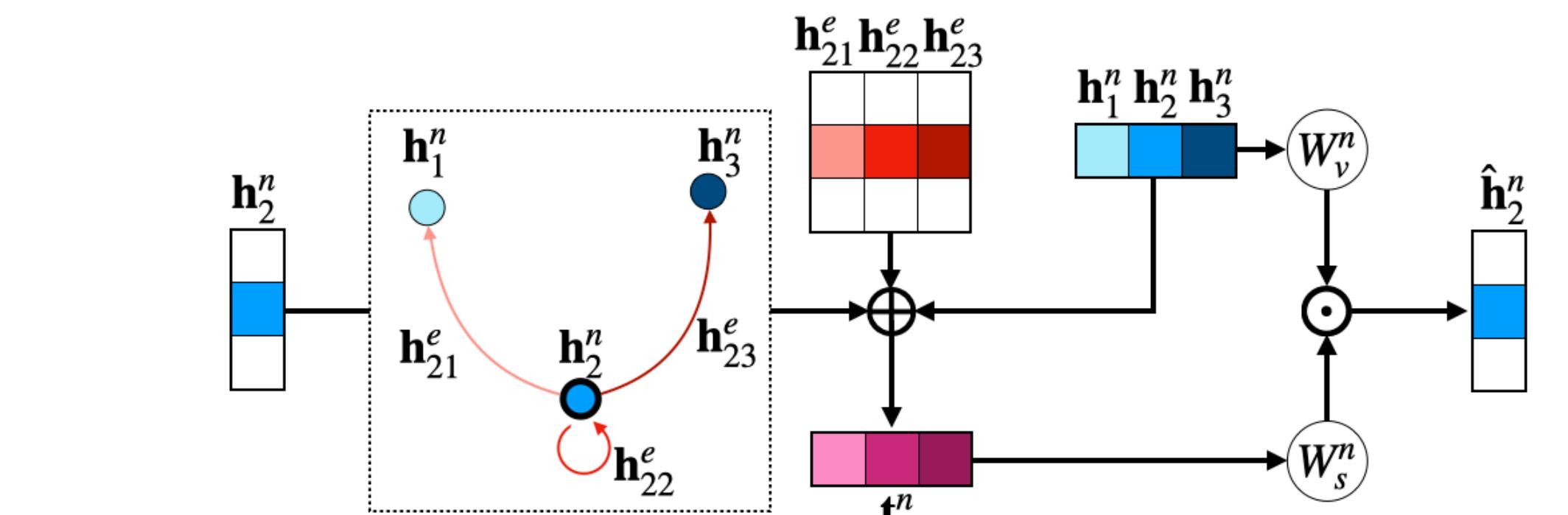


Scene Graph Transformer



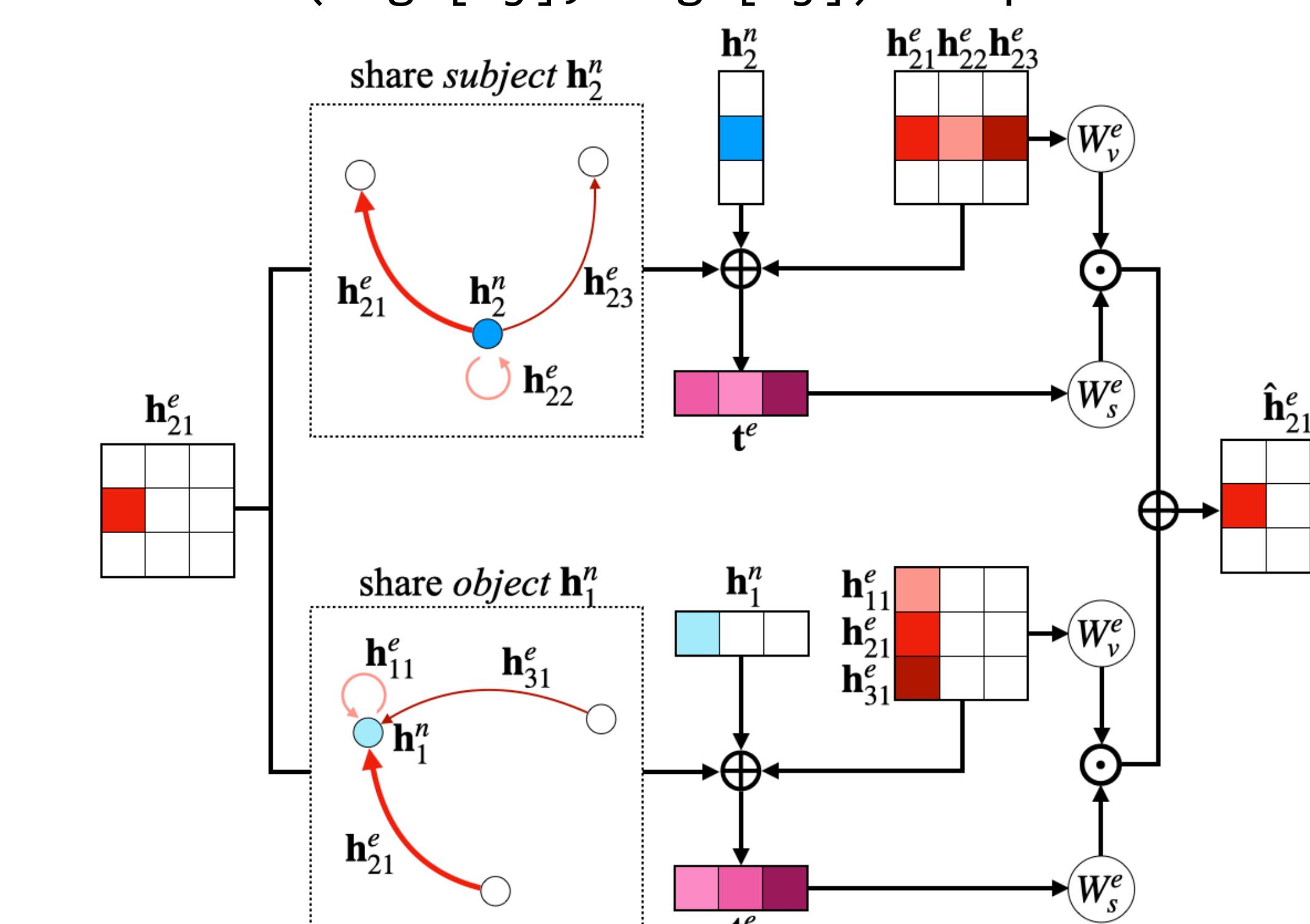
• Node-level Attention

Attention(node[i], node[j]) is dependent on edge[ij].



• Edge-level Attention

Attention(edge[ij], edge[ik]) is dependent on node[i].
Attention(edge[ij], edge[lj]) is dependent on node[j].

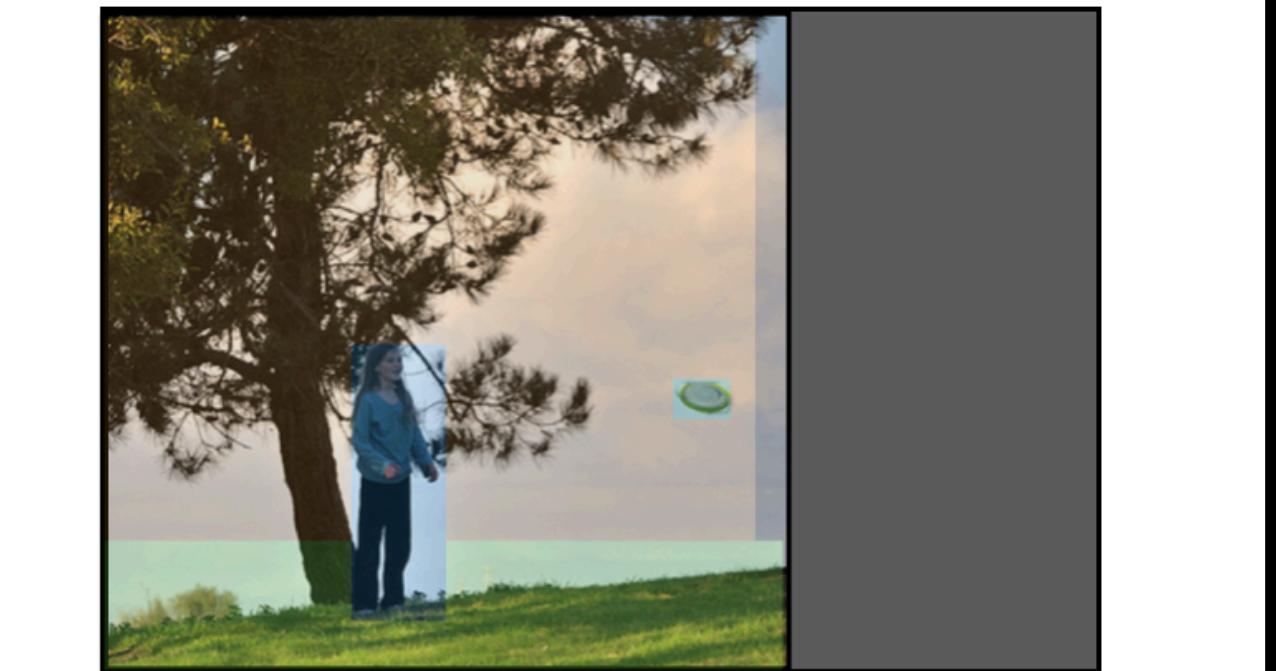
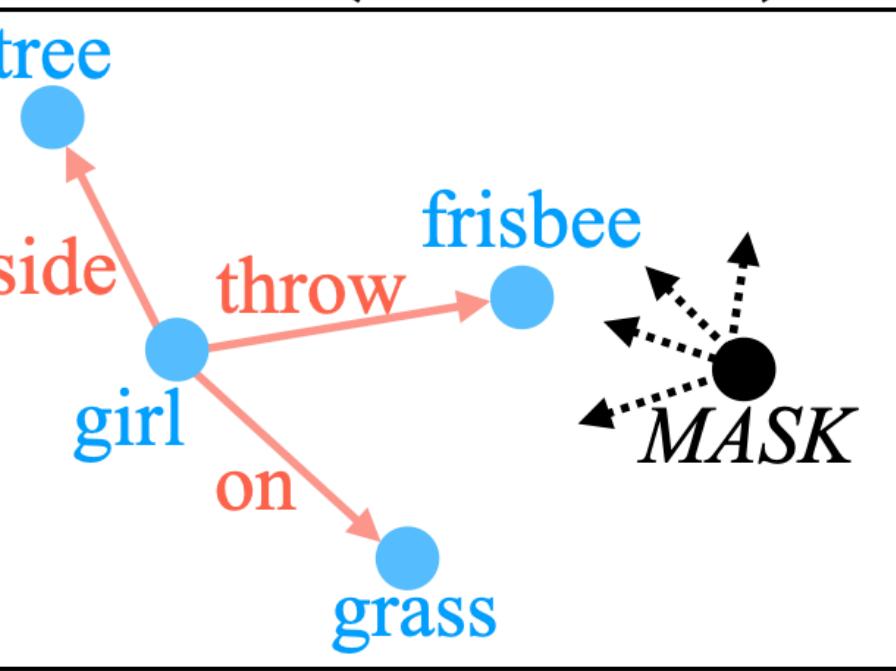


Proposed Model

• SGE + G2L

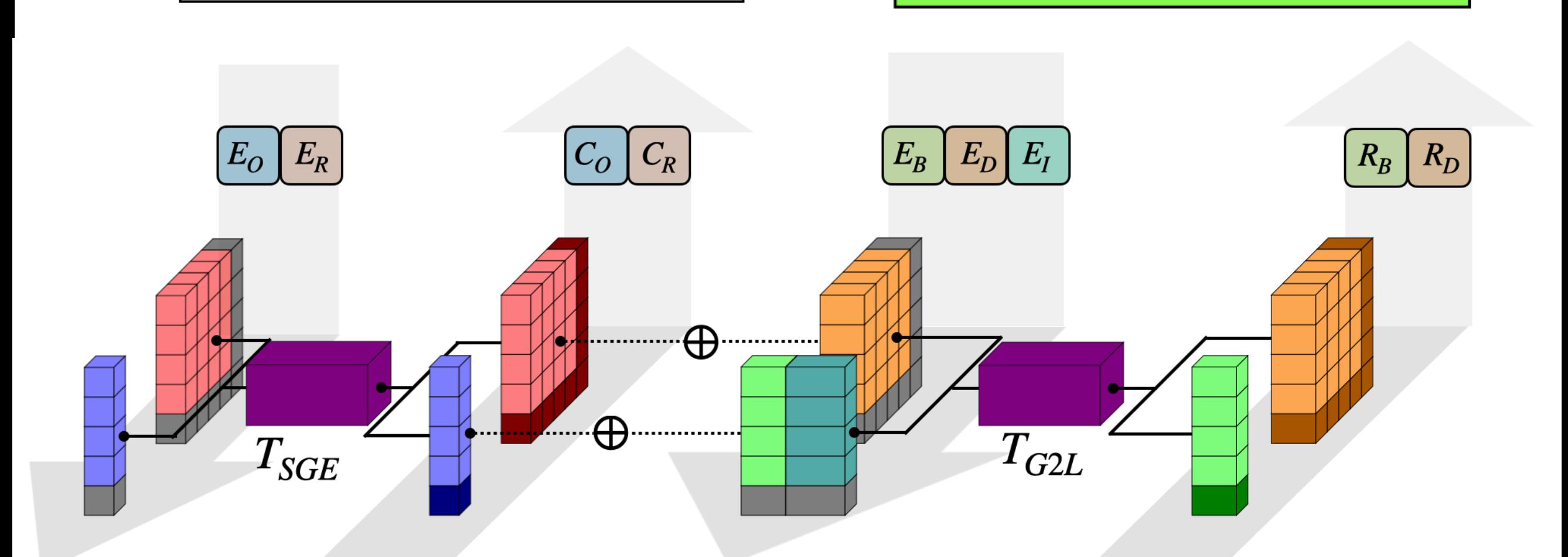
$$\mathcal{S}^{in} = (\mathbf{O}^{in}, \mathbf{R}^{in})$$

$$(\mathbf{L}^{in}, \mathbf{I}^{in}) = (\mathbf{B}^{in}, \mathbf{D}^{in}, \mathbf{I}^{in})$$



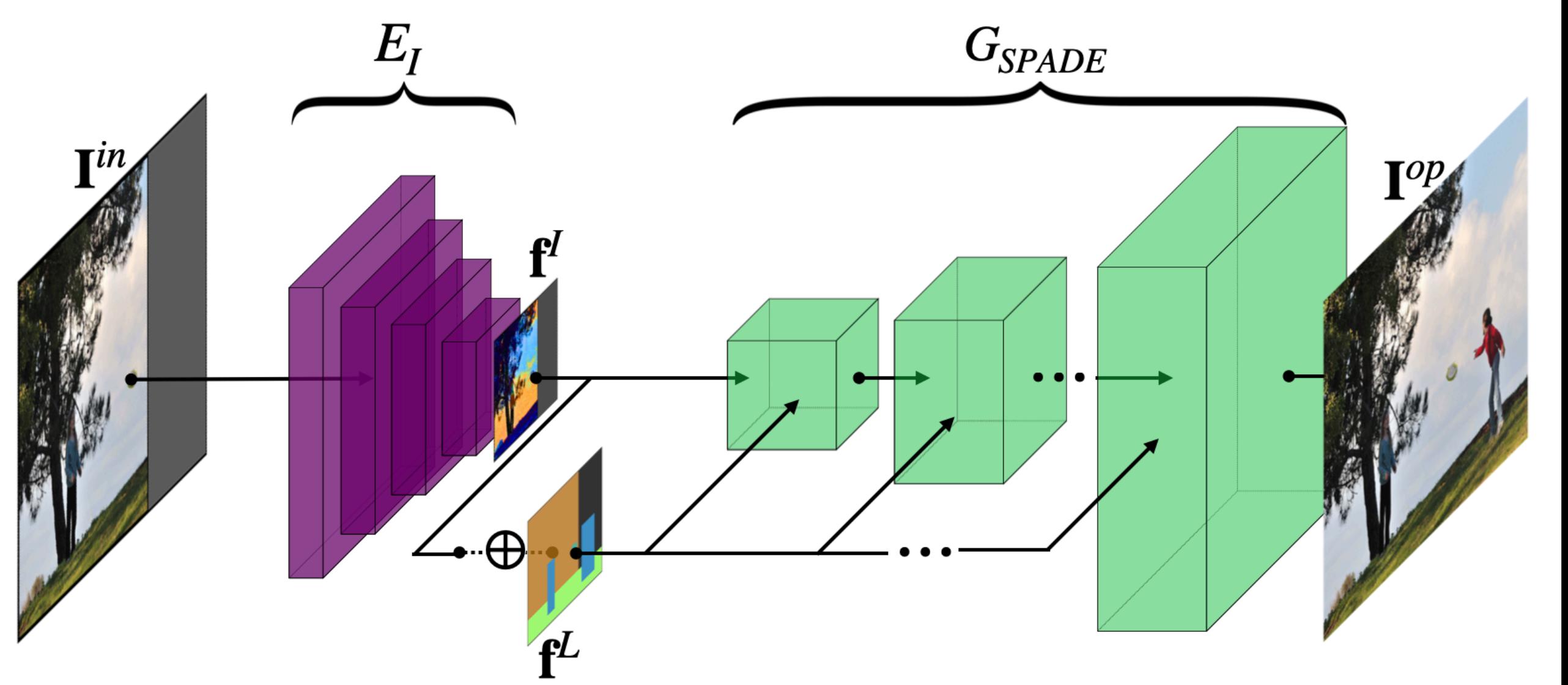
$$\mathcal{S}^{op} = (\mathbf{O}^{op}, \mathbf{R}^{op})$$

$$\mathbf{L}^{op} = (\mathbf{B}^{op}, \mathbf{D}^{op})$$



- Nodes: [objects labels](#); [bounding boxes](#); [object images](#)
- Edges: [relationships labels](#); [bounding boxes disparities](#)

• L2I



Experimental Results

VG-MSDN

	Object		Relation	
	rAVG ↓	Hit@ 1 / 5 ↑	rAVG ↓	Hit@ 1 / 5 ↑
Transformer	33.77	10.6 / 28.9	5.30	35.3 / 65.8
LTNet	24.45	13.9 / 34.8	4.70	34.8 / 74.6
GTwE	11.91	27.0 / 57.2	5.36	35.8 / 72.5
SGT	8.38	39.7 / 68.9	3.43	55.3 / 84.3

VG-MSDN COCO-stuff

	mIoU	mIoU
Transformer	5.1 / 71.2 / 51.9	10.4 / 75.7 / 61.2
GCN	11.4 / 70.6 / 50.0	21.1 / 72.3 / 60.8
GTwE	12.3 / 79.9 / 62.1	21.3 / 73.2 / 64.8
SGT	14.5 / 81.1 / 62.4	28.2 / 85.1 / 74.9

