



Unsupervised object discovery for instance recognition

Oriane Siméoni Ahmet Iscen Giorgos Tolias

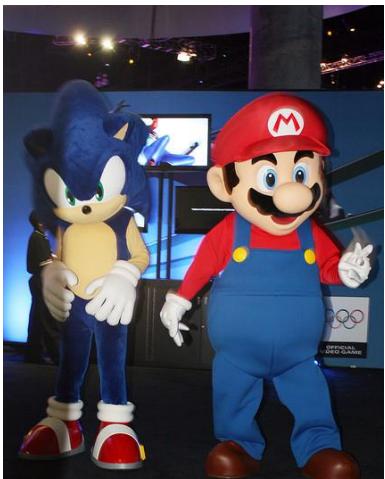
Yannis Avrithis Ondřej Chum

Retrieving the query



One query

Database



Retrieving the query

- One solution :
 - Index images using **one global descriptor** from the entire image



One query

Database



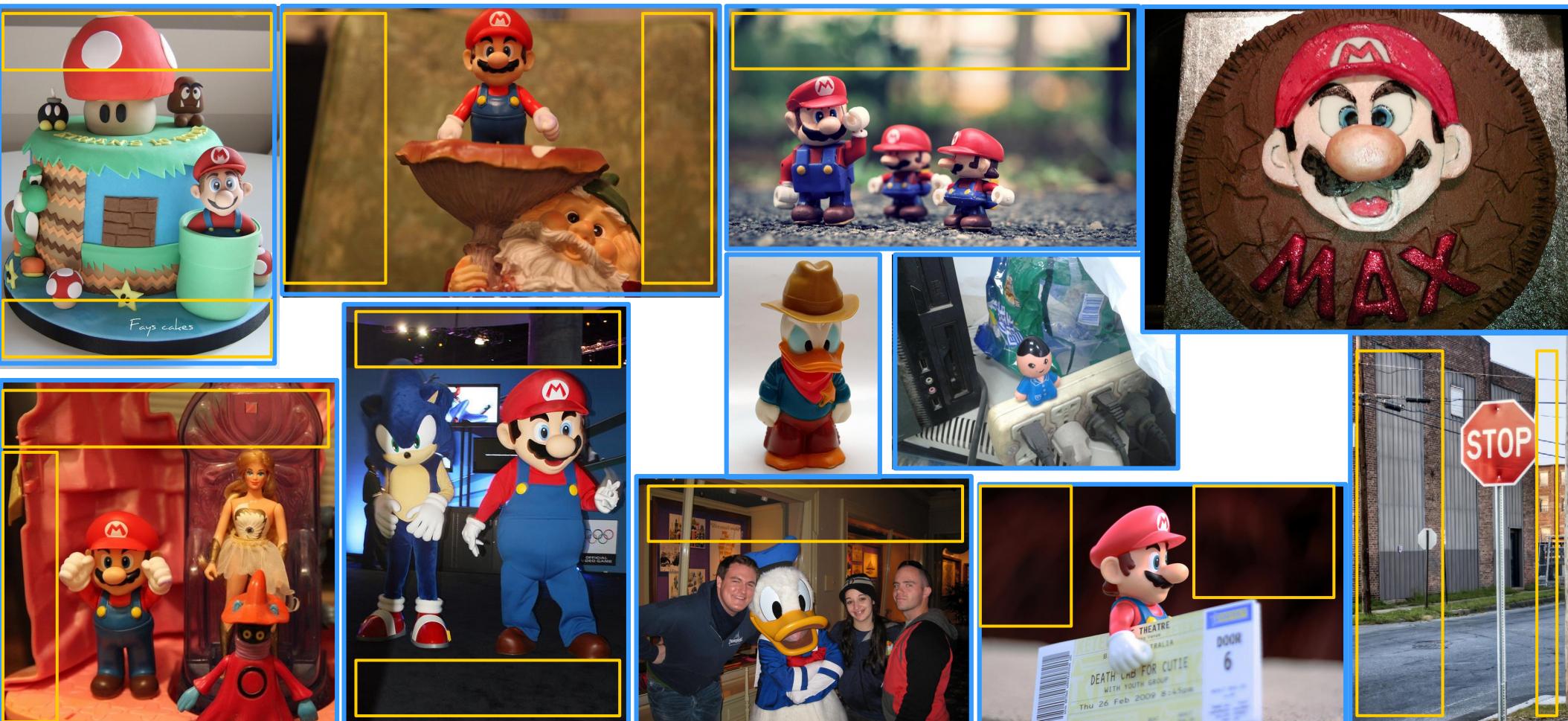
Retrieving the query

- One solution :
 - Index images using **one global descriptor** from the entire image
 - BUT : **background**



One query

Database



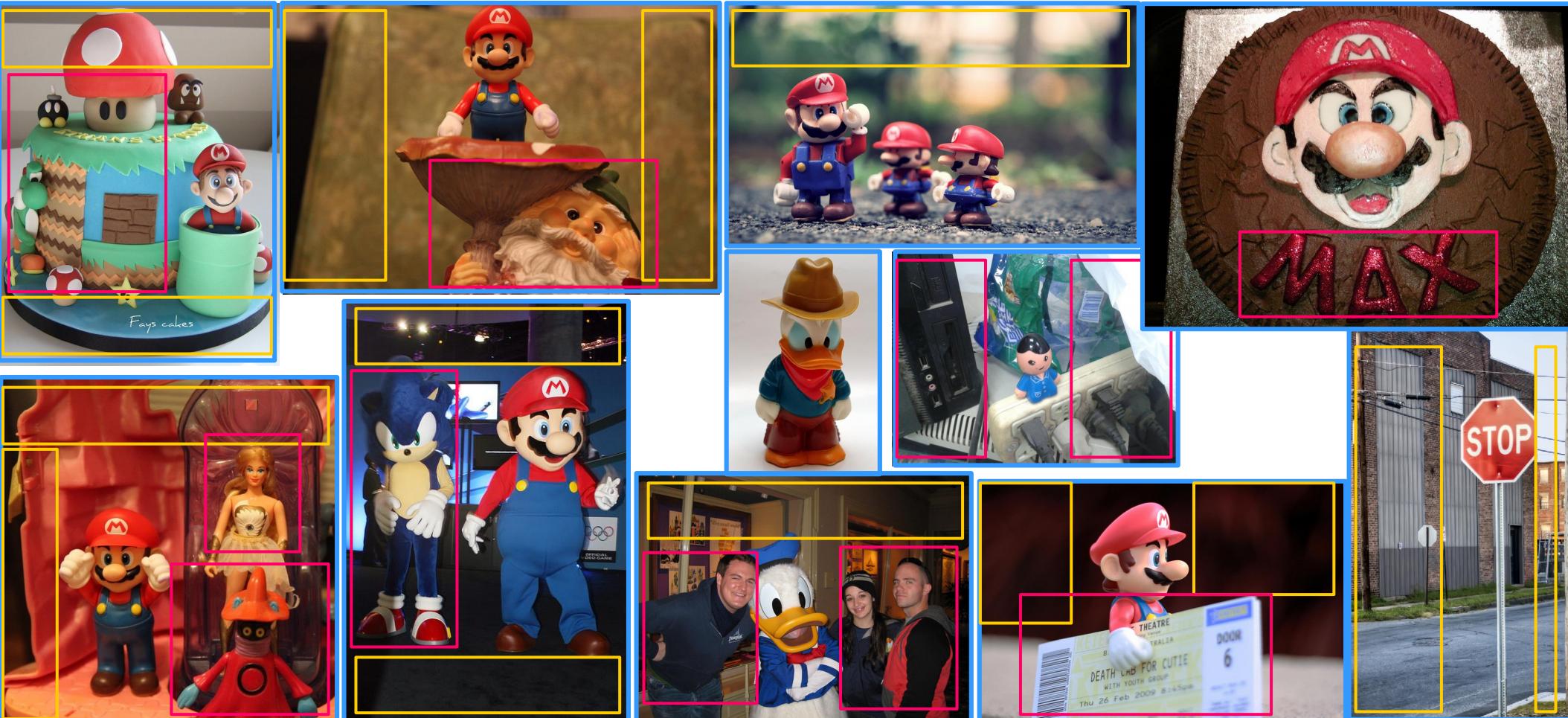
Retrieving the query

- One solution :
 - Index images using **one global descriptor** from the entire image
 - BUT : **background, clutter** and obstruction alter the quality of the descriptor



One query

Database



Retrieving the query

- Other solution :
 - Index images using **a regional descriptor** constructed from uniformly sampled regions



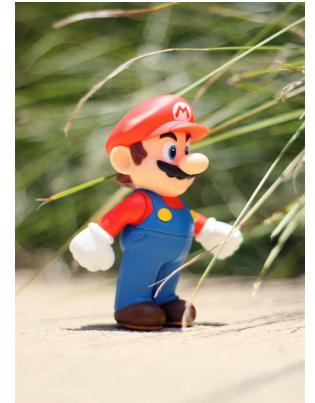
One query

Database



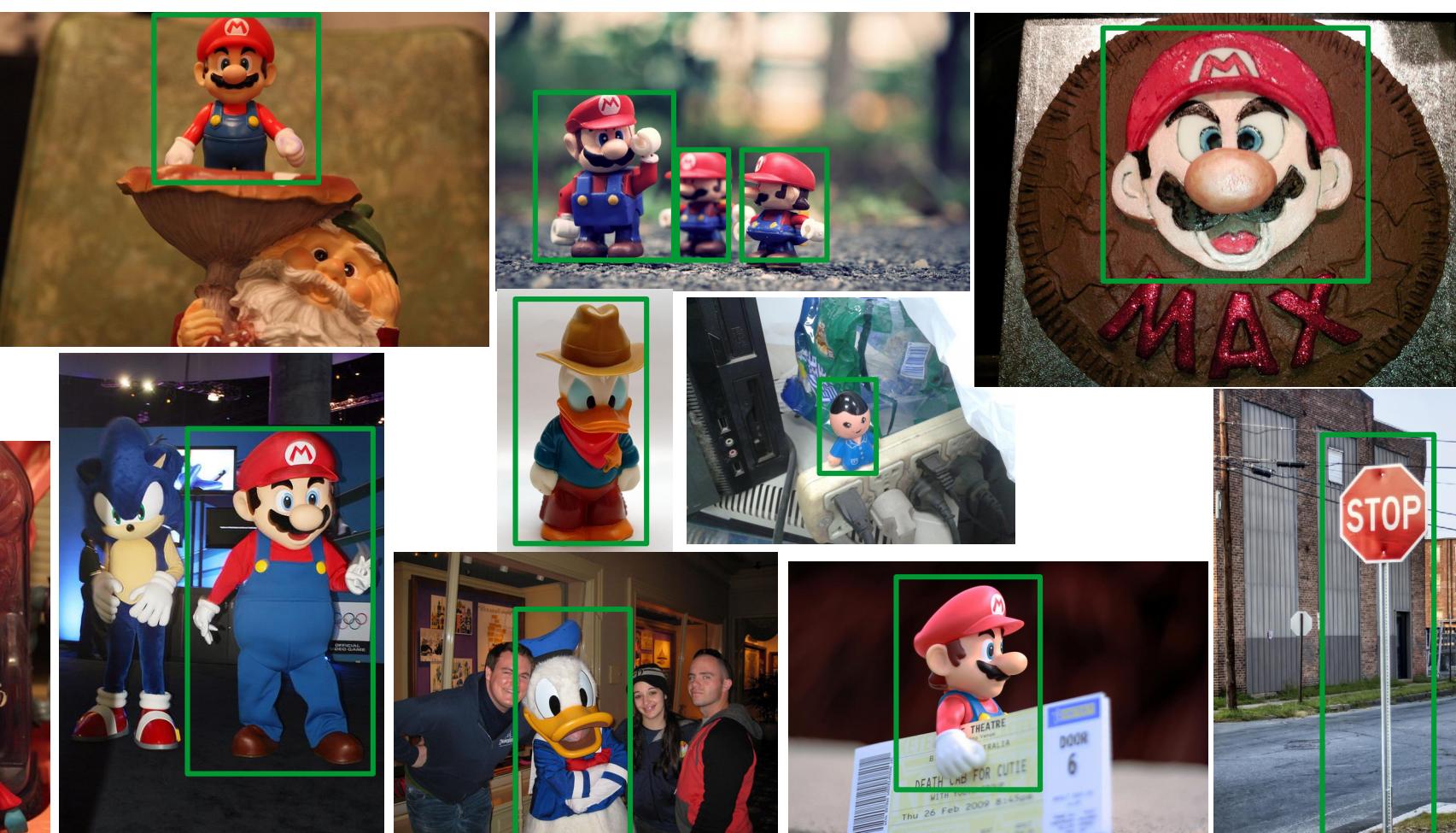
Retrieving the query

- Our solution:
 - Create one global descriptor using the most discriminative regions
→ corresponding to repeating database objects



One query

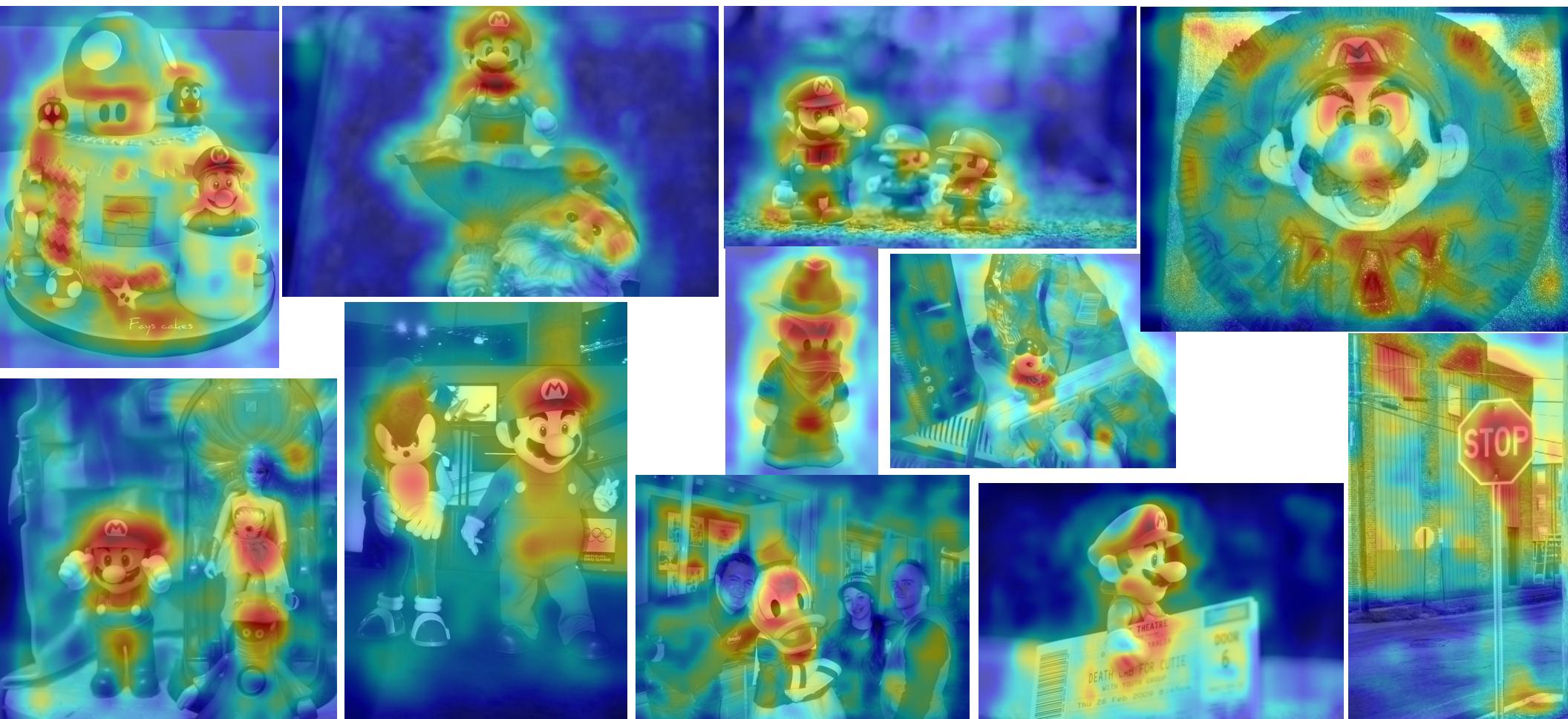
Database



Create saliencies

- Computed using CNN activations
→ eg. Crow - Kalantidis et al. ArXiv 2015

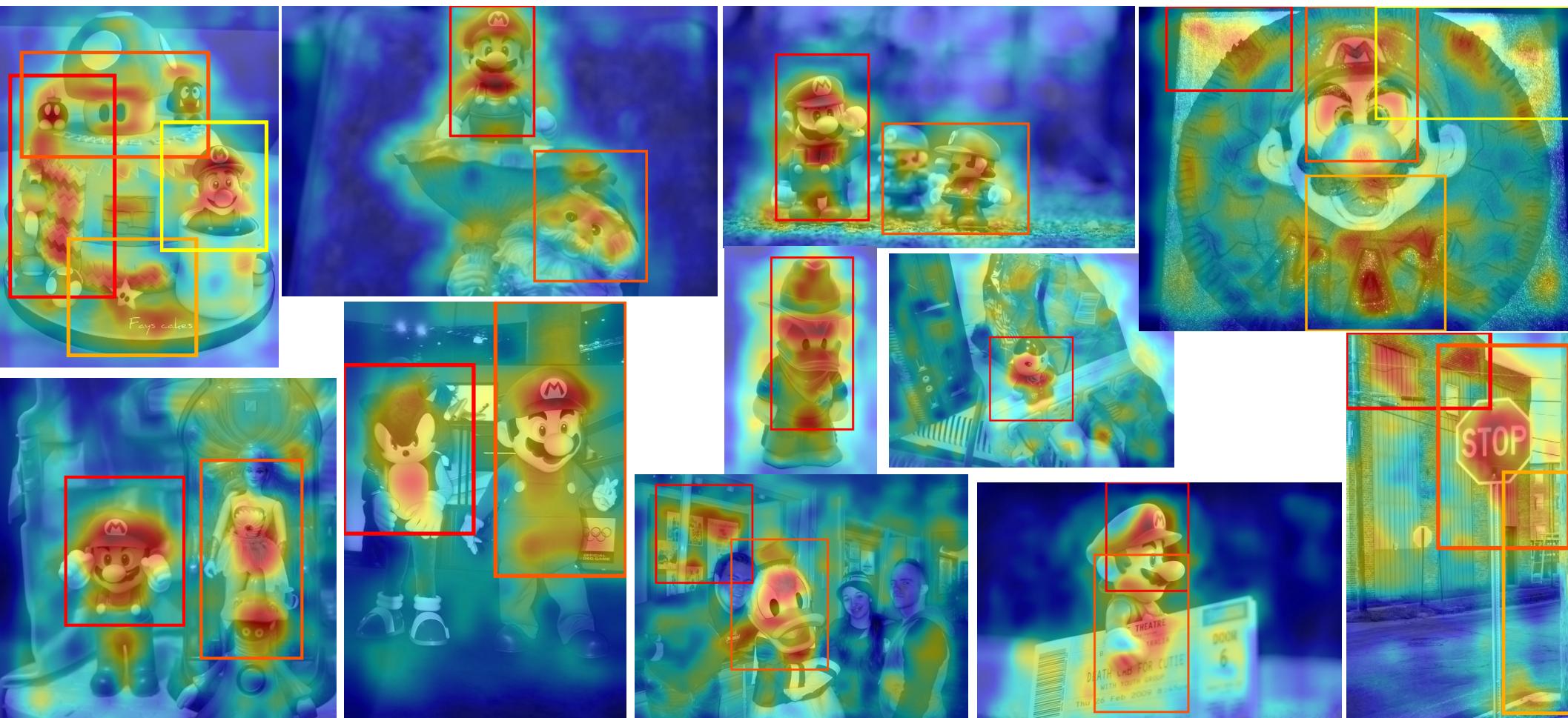
Database



Detect regions on saliency maps

- Use expanded version of Expanding Gaussian Mixture
 - Avrithis et al. ECCV 2012 - to detect regions on saliency maps

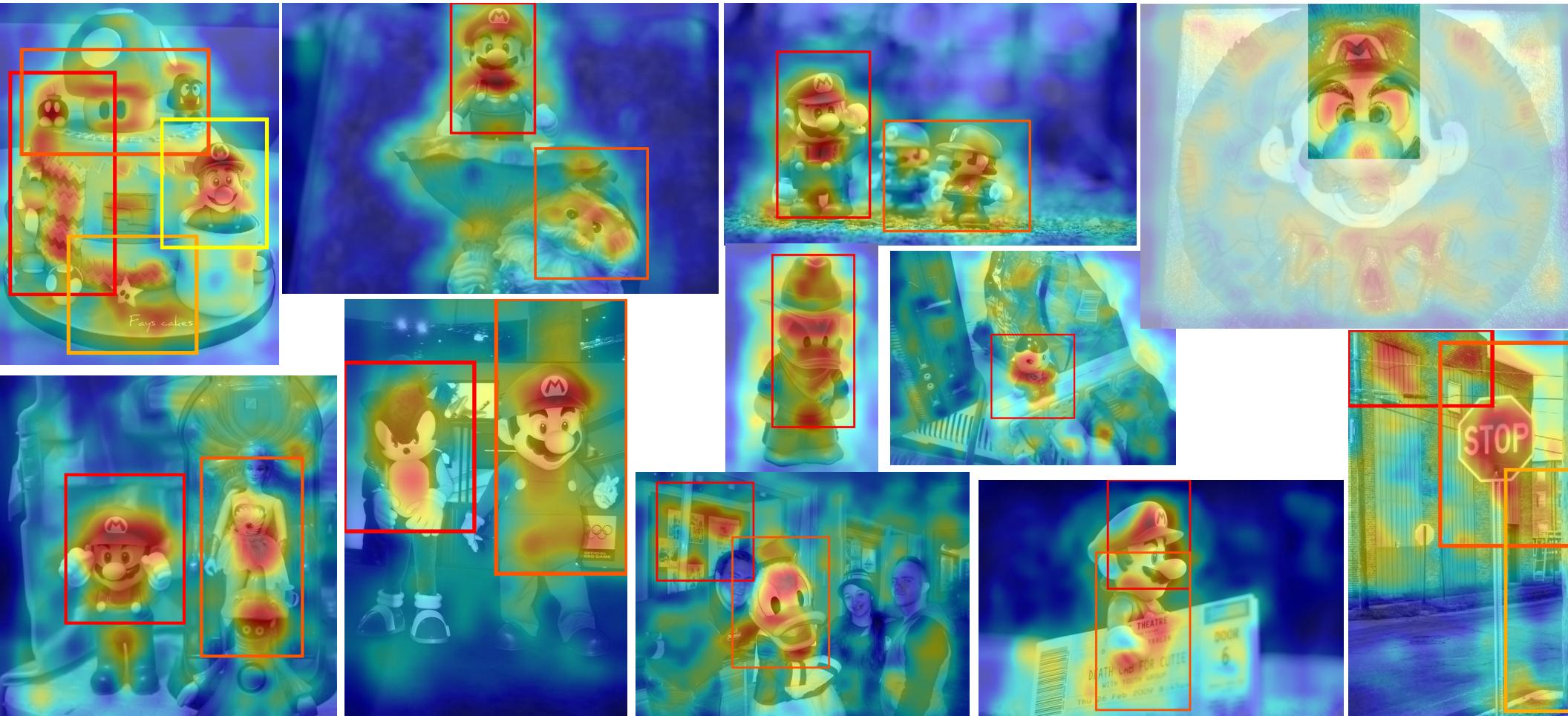
Database



Create a knn-graph

- Consider each detected region independently

Database



Create a knn-graph

- Consider each detected region independently
 - Find its nearest neighbors

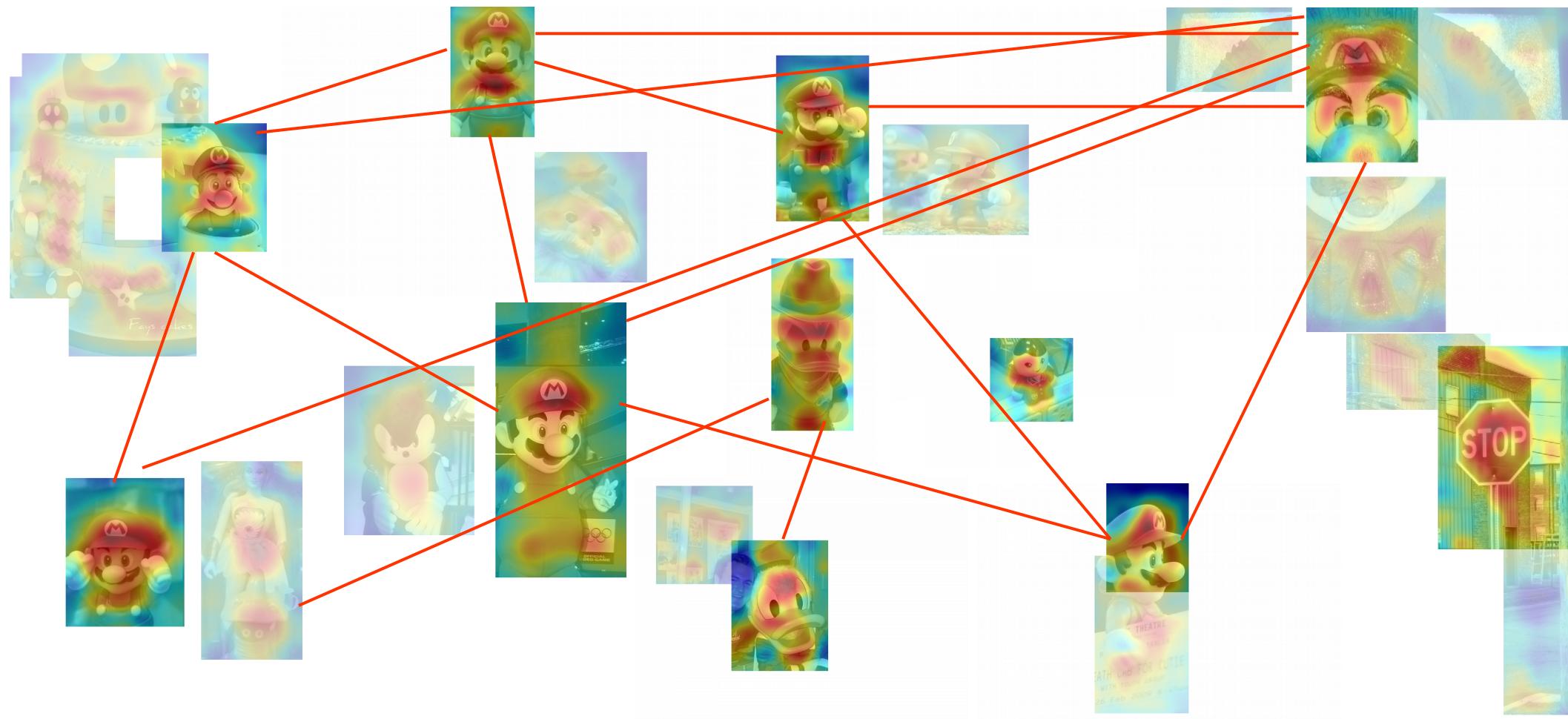
Database



Create a knn-graph

- Consider each detected region independently
 - Find its nearest neighbors
- Create the knn-graph

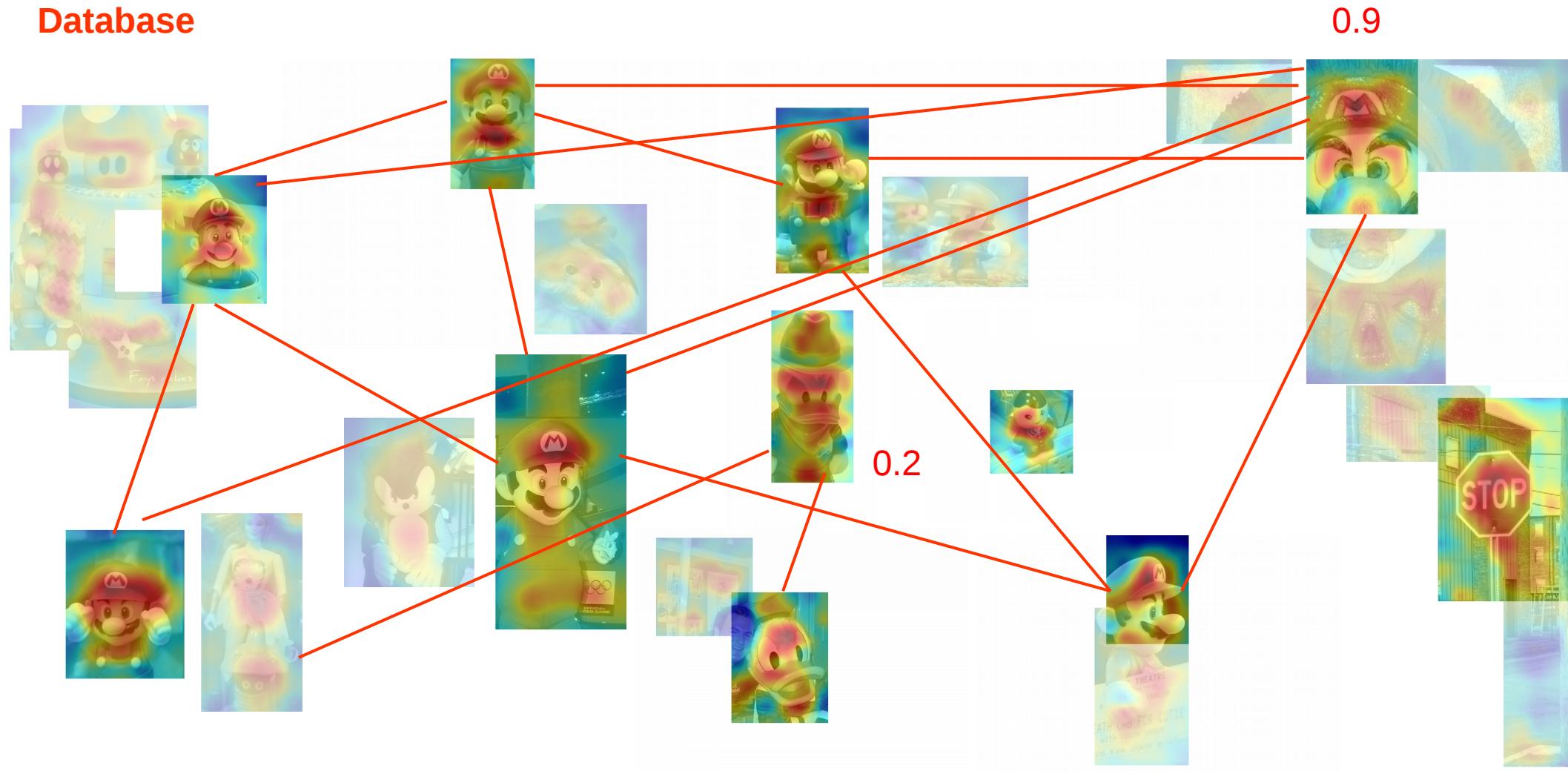
Database



Create a knn-graph

- Consider each detected region independently
 - Find its nearest neighbors
- Create the knn-graph
 - Compute katz centrality, it reflects a node importance

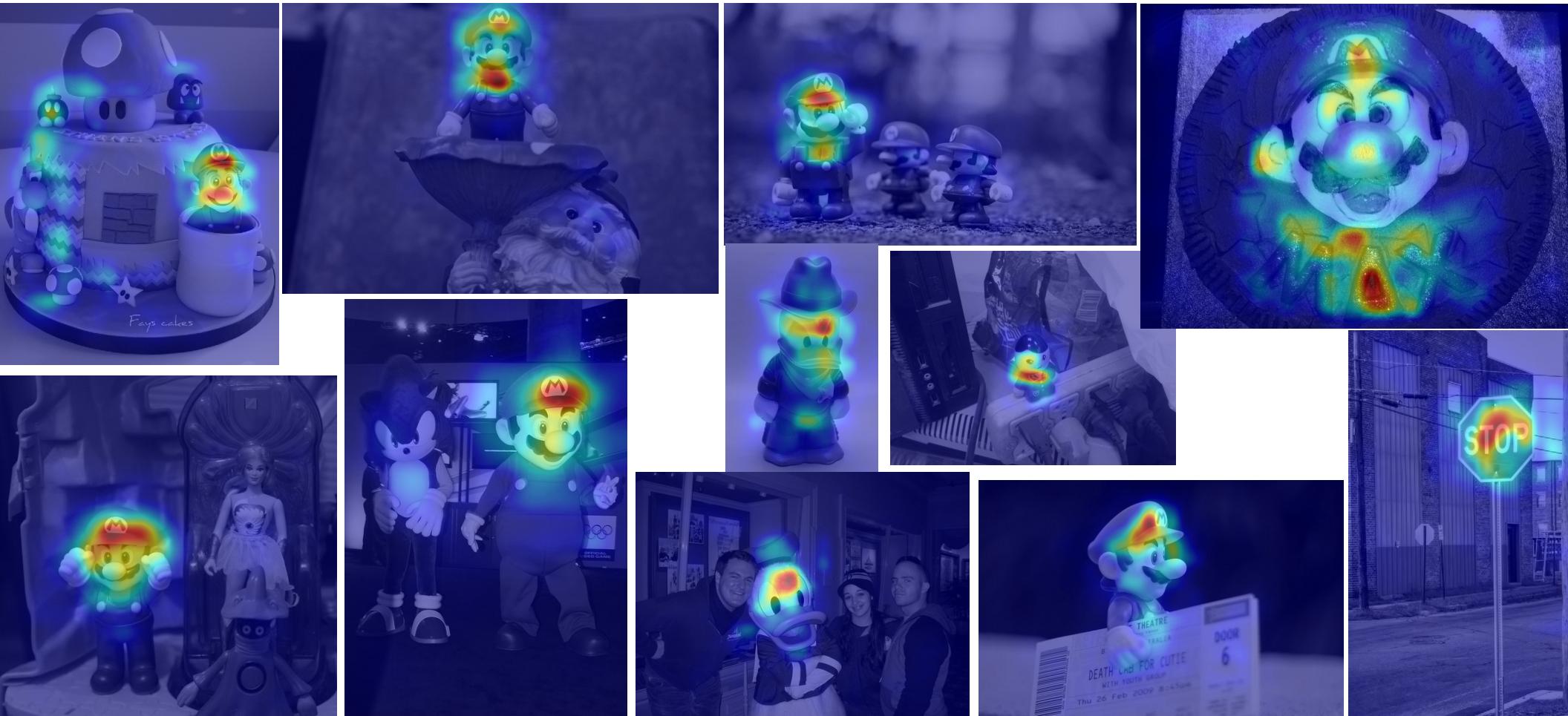
Database



Compute Object Saliency

- For each patch of a sliding window :
 - Find nearest neighbors in the graph
 - Sum centrality of the neighbors

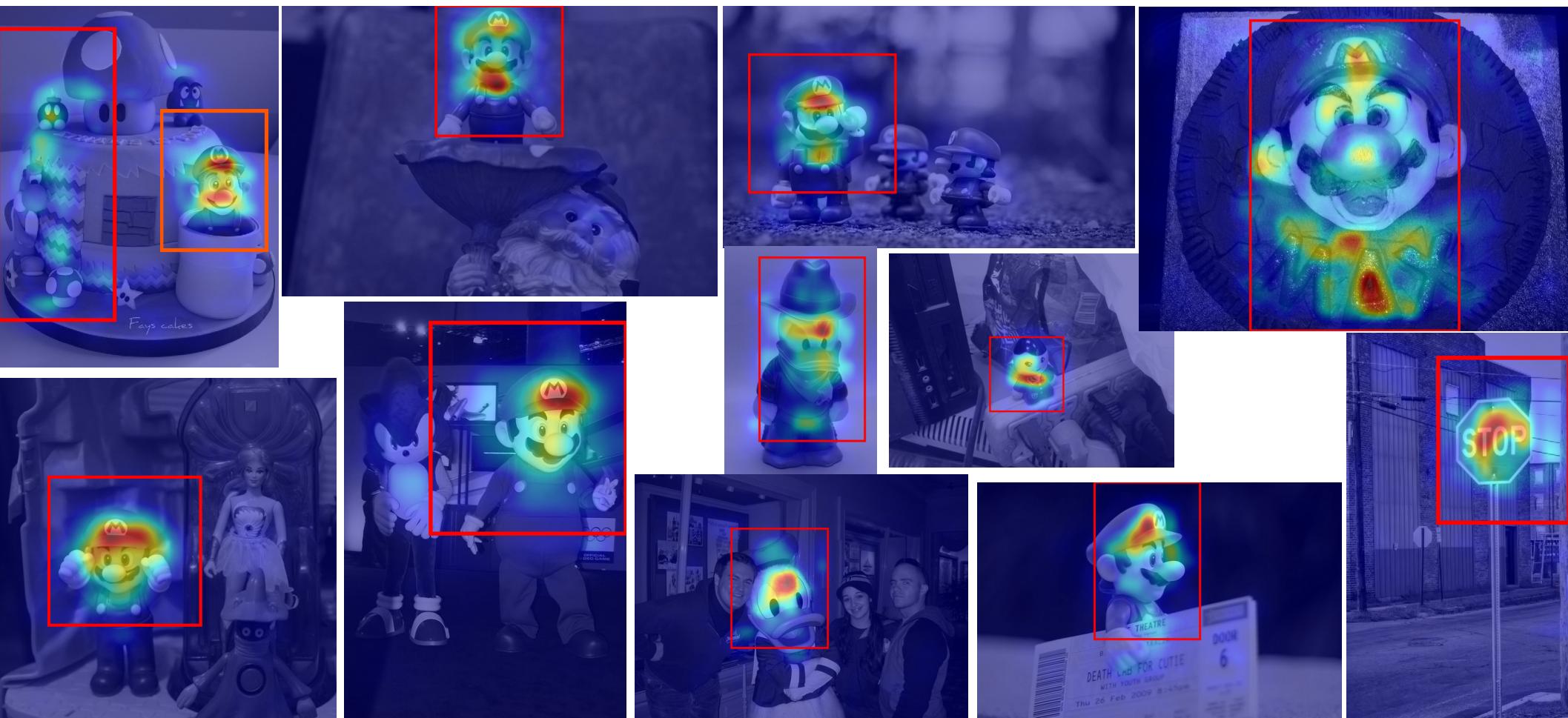
Database



Detect regions on the object saliency

- Use Expanding Gaussian Mixture on saliency maps to detect regions

Database



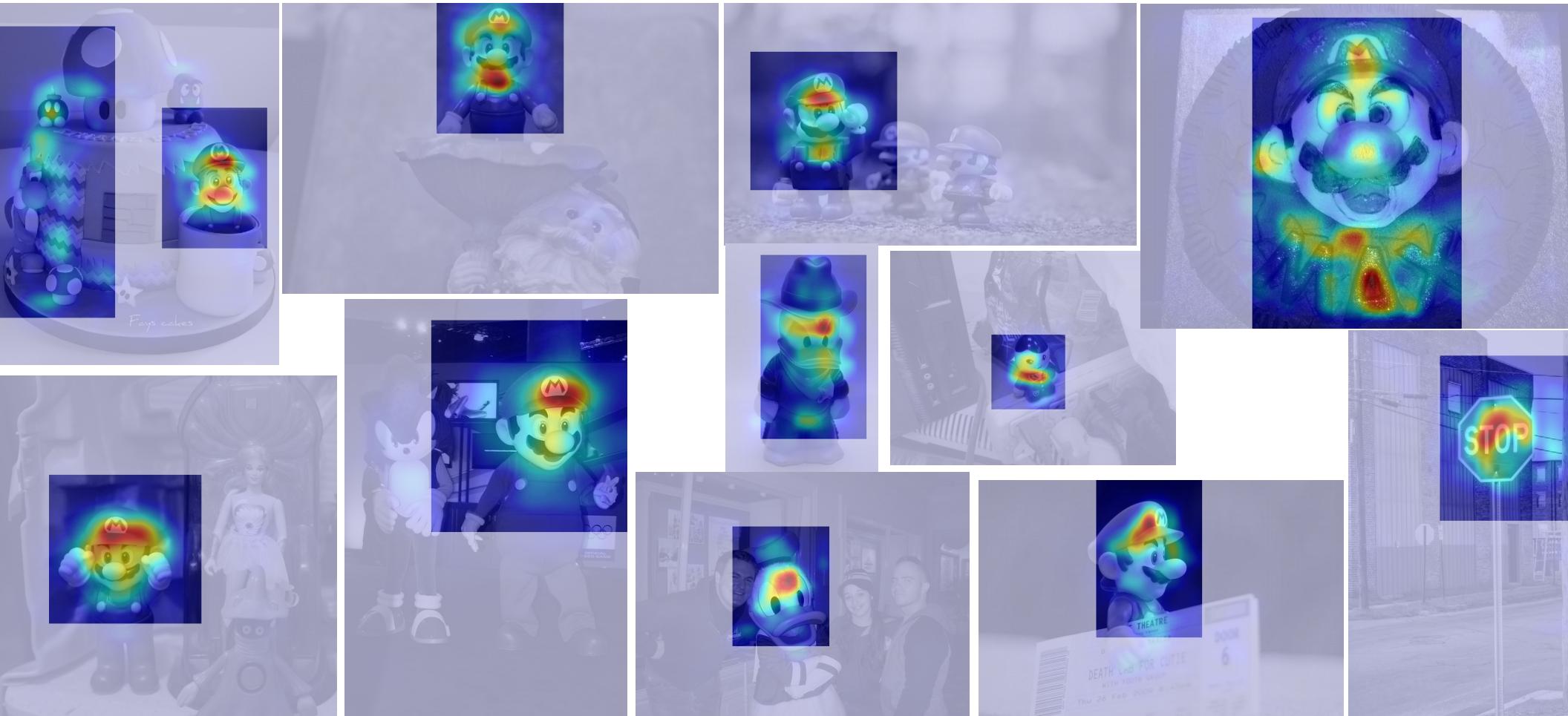
Detect regions on the object saliency

- Again, using Expanding Gaussian Mixture

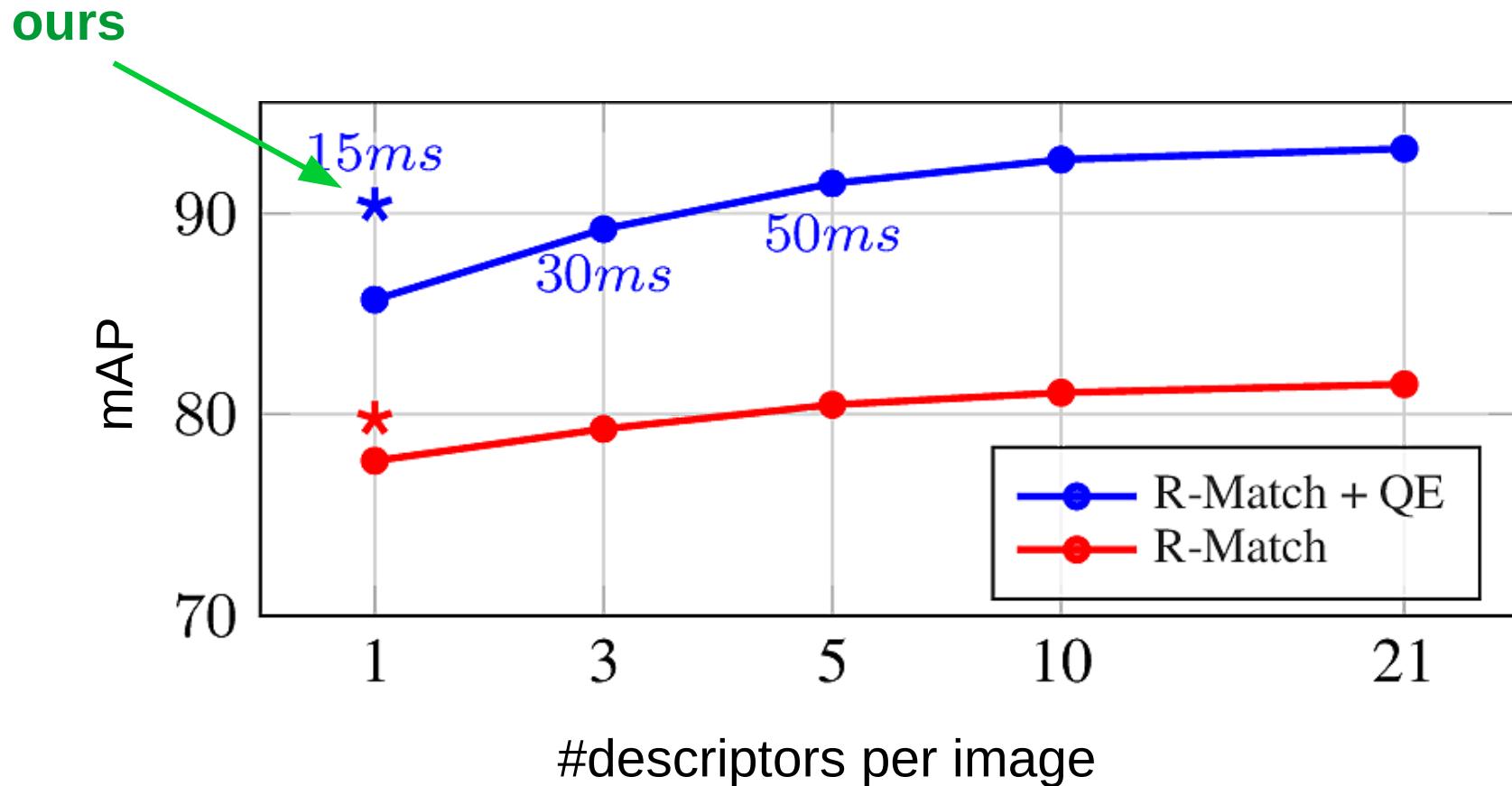
Now we are able to find Mario everywhere !



Database

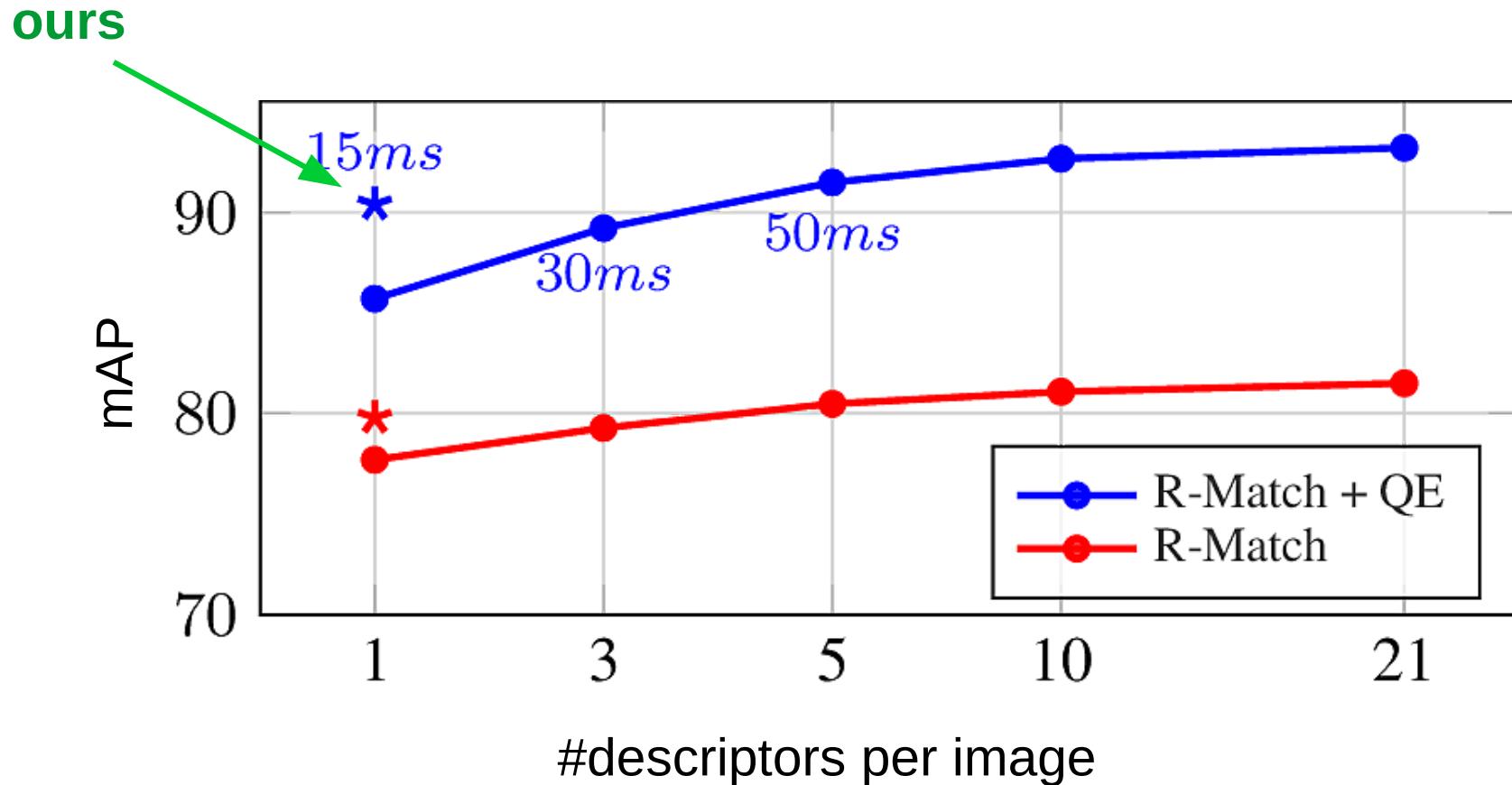


Results



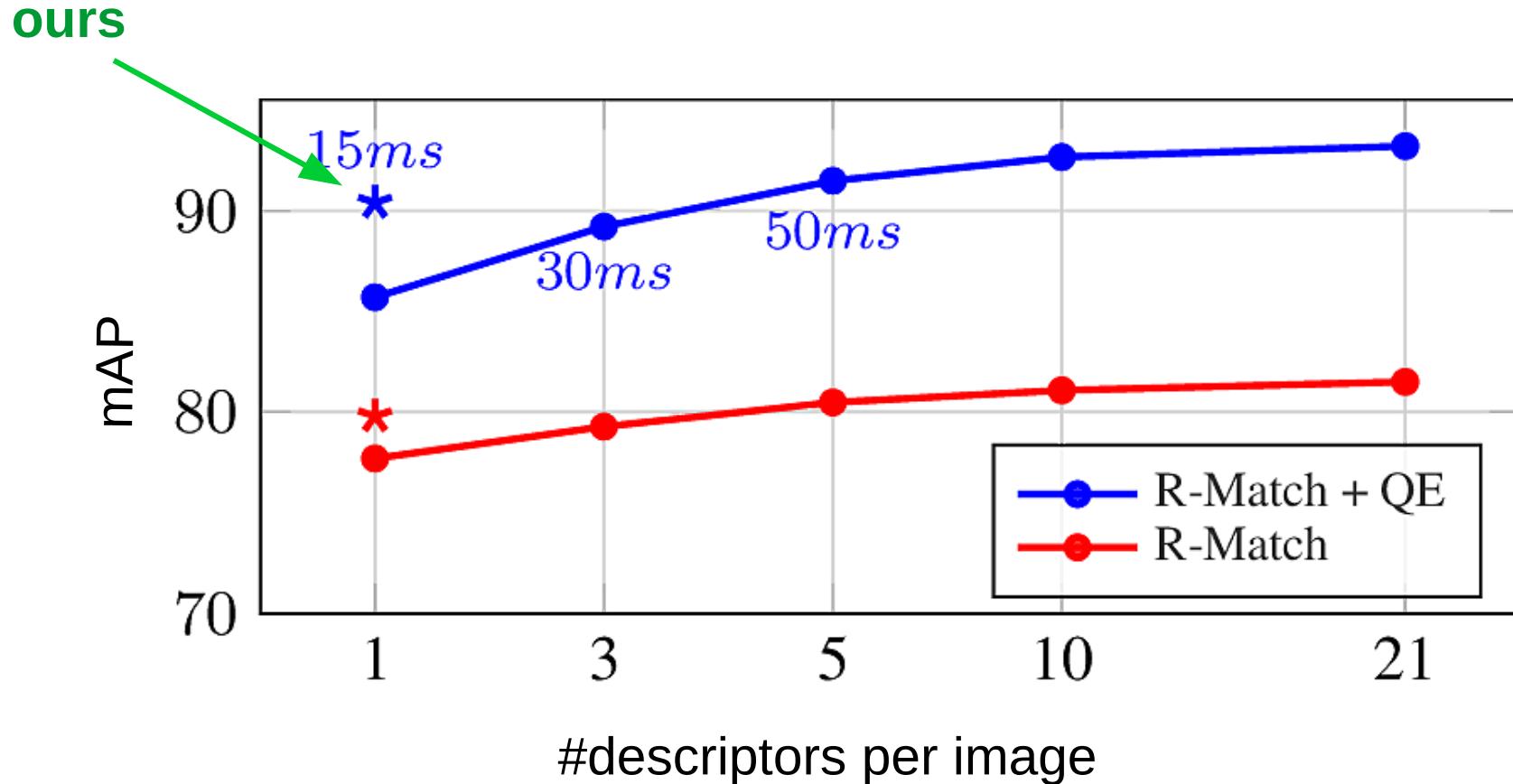
✓ Same performance

Results



- ✓ Same performance
- ✓ 3 time faster at query time

Results



- ✓ Same performance
- ✓ 3 time faster at query time
- ✓ 4 time less memory

For details, please come to the **poster #XX**

Thank you for listening