

Structured Visual Search via Composition-aware Learning

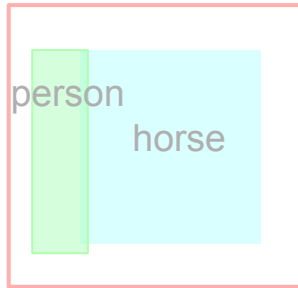
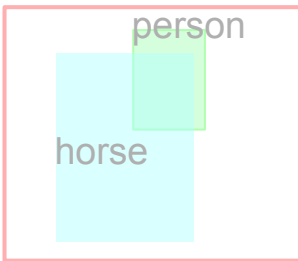
Mert Kilickaya, Arnold Smeulders



Textual Query

person

horse

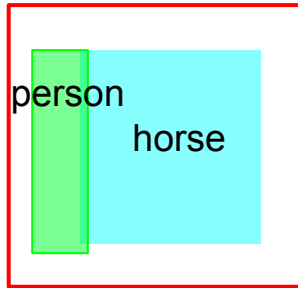
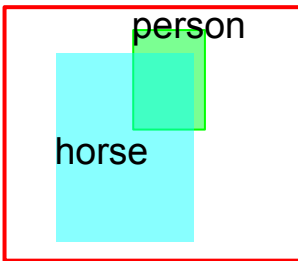


Textual Query

person
horse



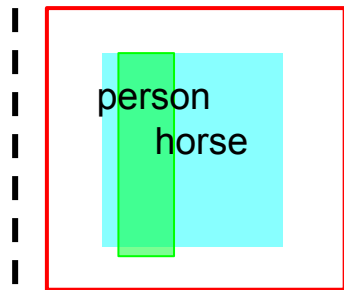
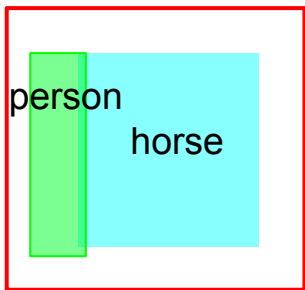
Structured Query



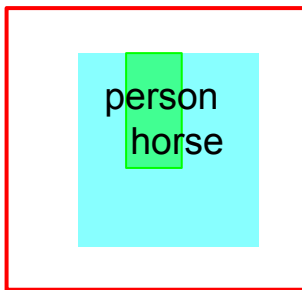
Structured query encodes the *spatial* intentions of the users

Reference Q

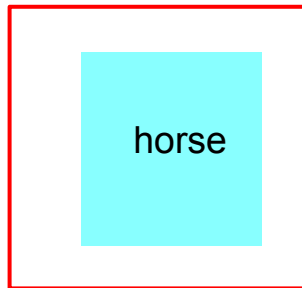
Candidate Q



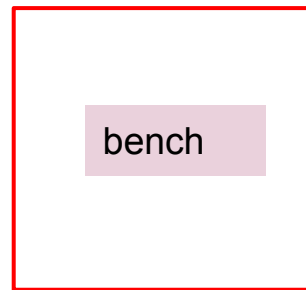
...



...



...



$mIoU(R, C)$

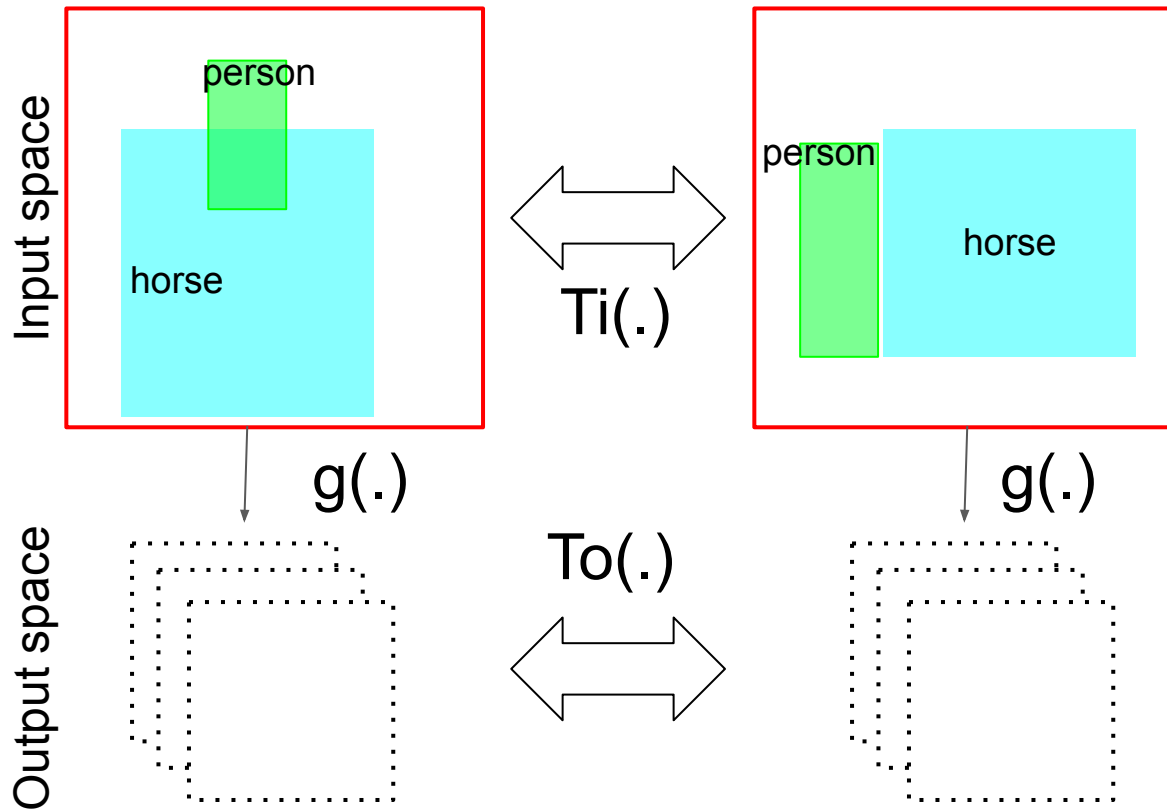
0.90

0.72

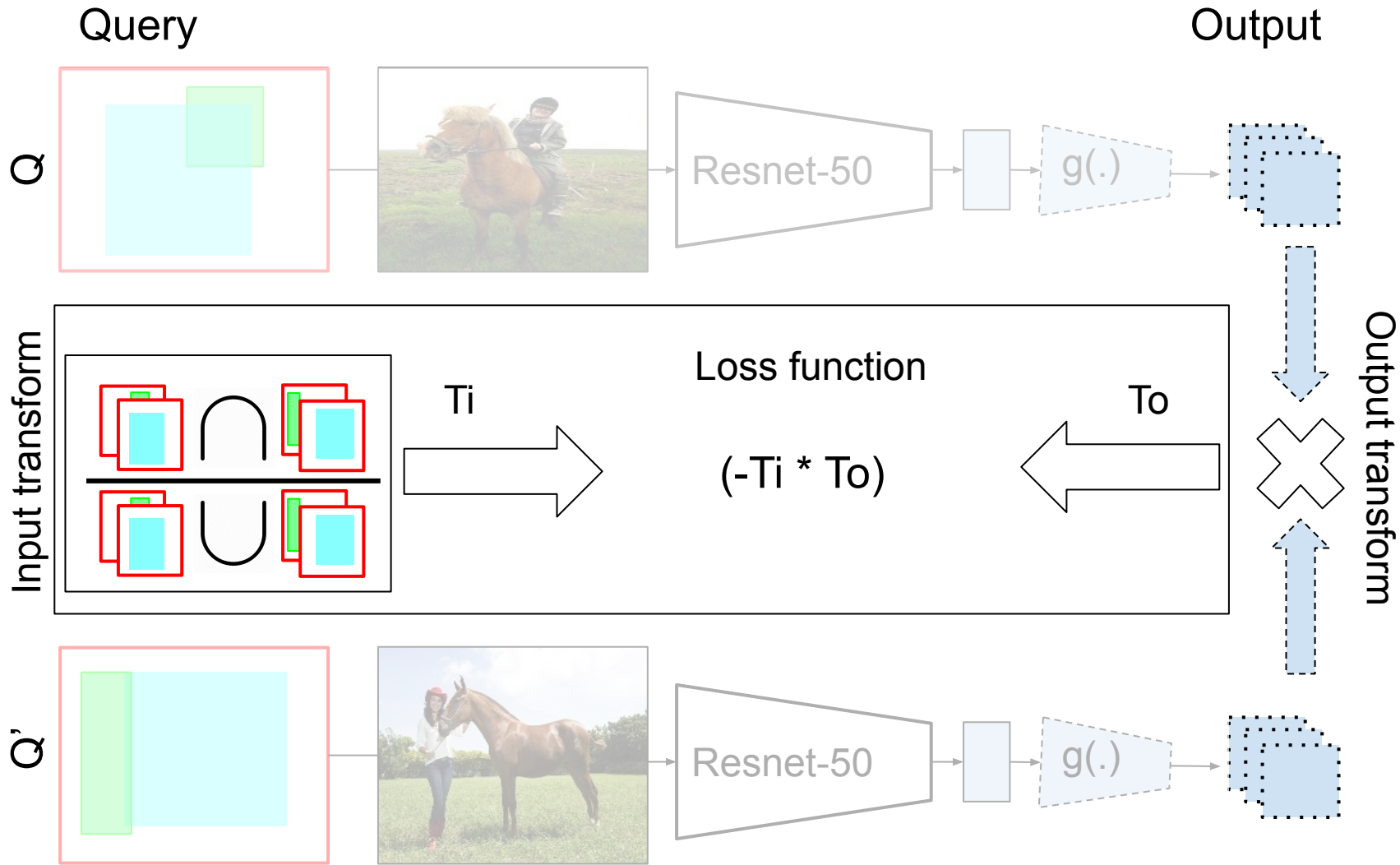
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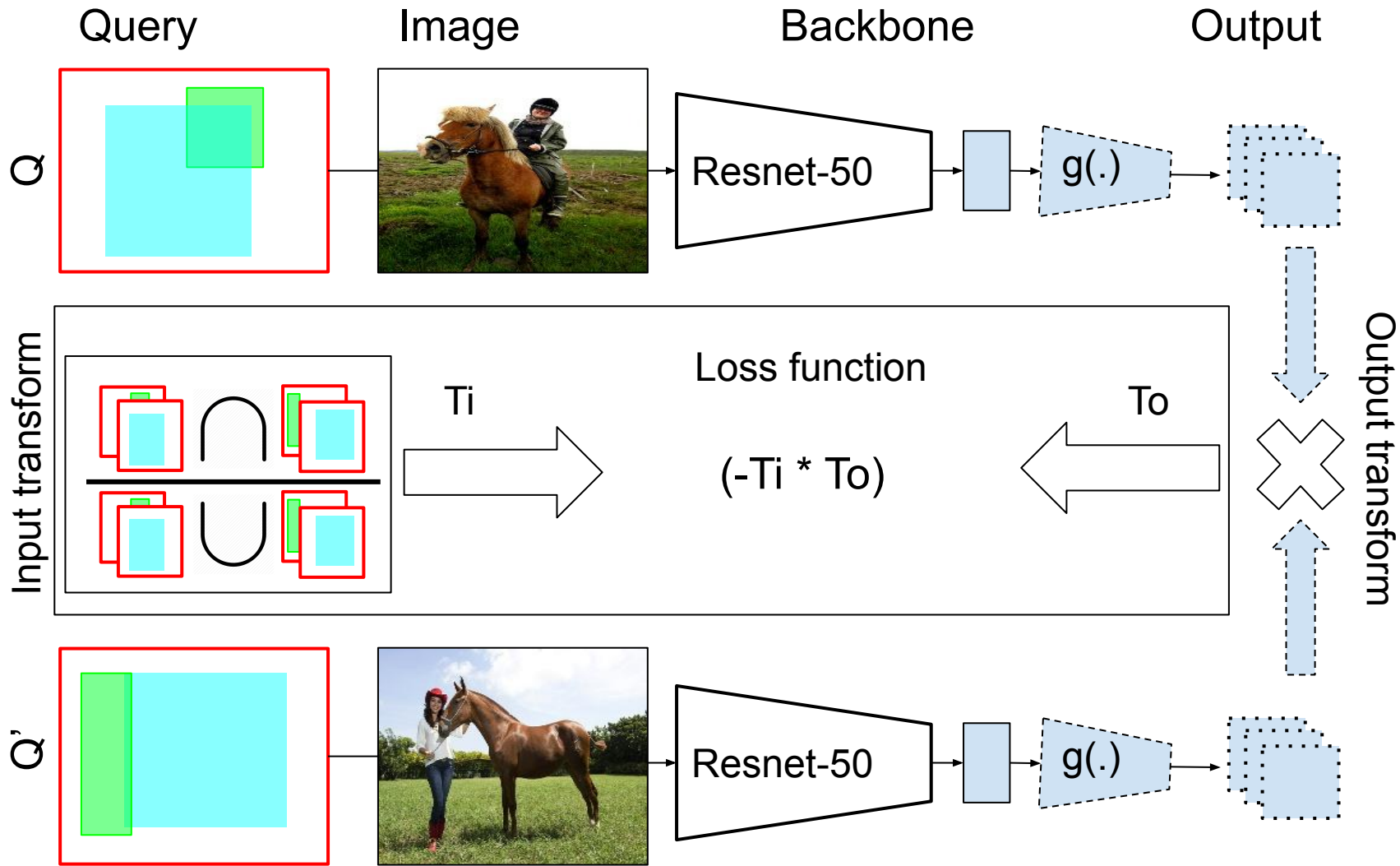
0.0

Continuous relationships between structured queries carry useful information



We enforce the output (feature) space to change *predictably* with the input (query) space structure.





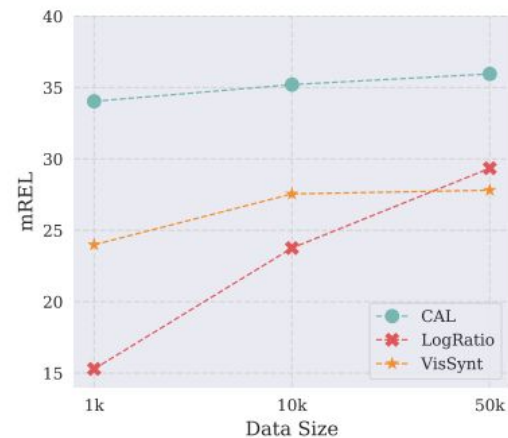
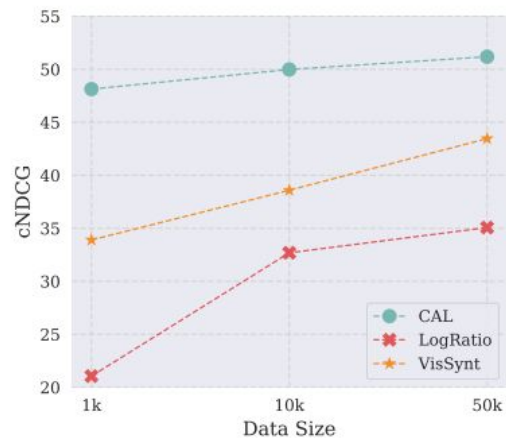
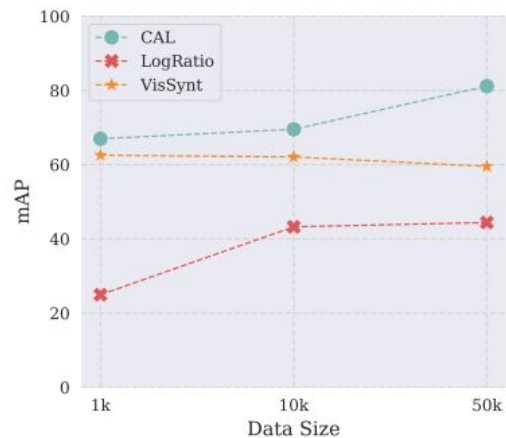
Experimental Setup

Metrics: mAP (discrete) | cNDCG (continuous) | mREL (continuous)

Datasets: MS-coco: 5k Query - 50k Train - 67k Gallery | HICO-DET: 10k Query - 40k Gallery

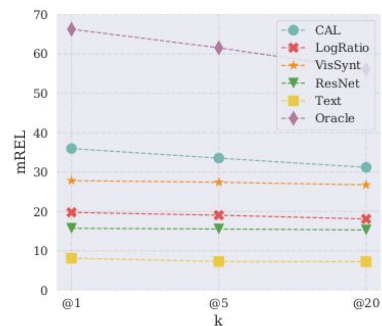
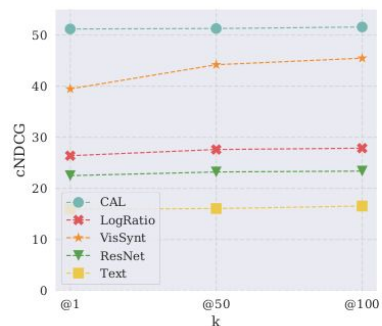
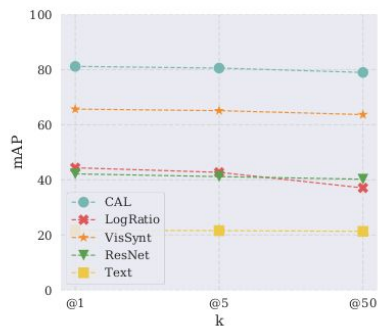
Baselines: Visual | Textual | VisSynt (CVPR'17) | LogRatio (CVPR'19)

Exp 1. Sample Efficiency on MS-coco

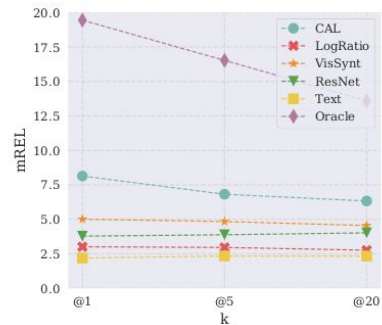
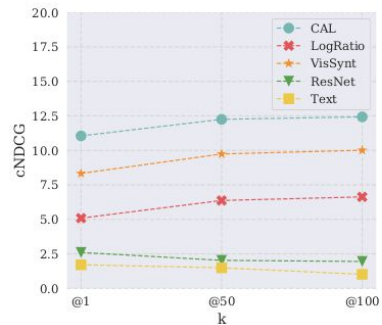
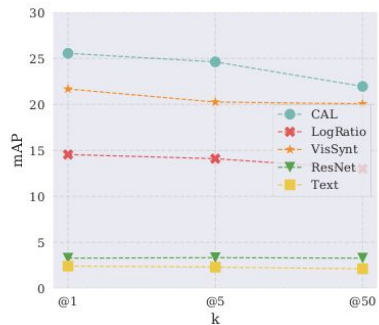


CAL learns more from less examples.

Exp 2. SotA Comparison on MS-coco and HICO-DET



Benchmarking on MS-COCO [29]. Our method outperforms existing techniques for all three metrics.



Benchmarking on HICO-DET [4]. Our method transfers better to HICO-DET dataset for object-interaction search.

Exp 3. Qualitative Analysis

| Query | Retrieval |
|----------------------|--|
| stop sign |  |
| stop sign |  |
| person bench |  |
| person t. racket |  |
| person skateboard |  |

CAL can learn to model visual interactional compositions.

Summary

We tackle structured visual search from 2D-canvas using Composition-aware learning

Composition-aware learning leverages continuous-valued transformations between queries

As a result, our model learns more from fewer examples when searching for visual interactions

wine x cheese x

Layout filter

Composition Search

C W

Include copy space

Search and the keywords will appear in the box above, ready to be moved into position.



<https://www.shutterstock.com/showcase/compositionsearch/>