EMBEDDING SPATIAL INFORMATION INTO IMAGE CONTENT DESCRIPTION FOR SCENE RETRIEVAL

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Abstract

We present Δ-TSR, an image content representation describing the spatial layout with triangular relationships of visual entities, which can be symbolic objects or low-level visual features. A semi-local implementation of Δ-TSR is also proposed, making the description robust to viewpoint changes. We evaluate Δ-TSR for image retrieval under the query-by-example paradigm, on contents represented with interest points in a bag-of-features model: it improves state-of-the-art techniques, in terms of retrieval quality as well as of execution time, and is scalable. Finally, its effectiveness is evaluated on a topical scenario dedicated to scene retrieval in datasets of city landmarks.
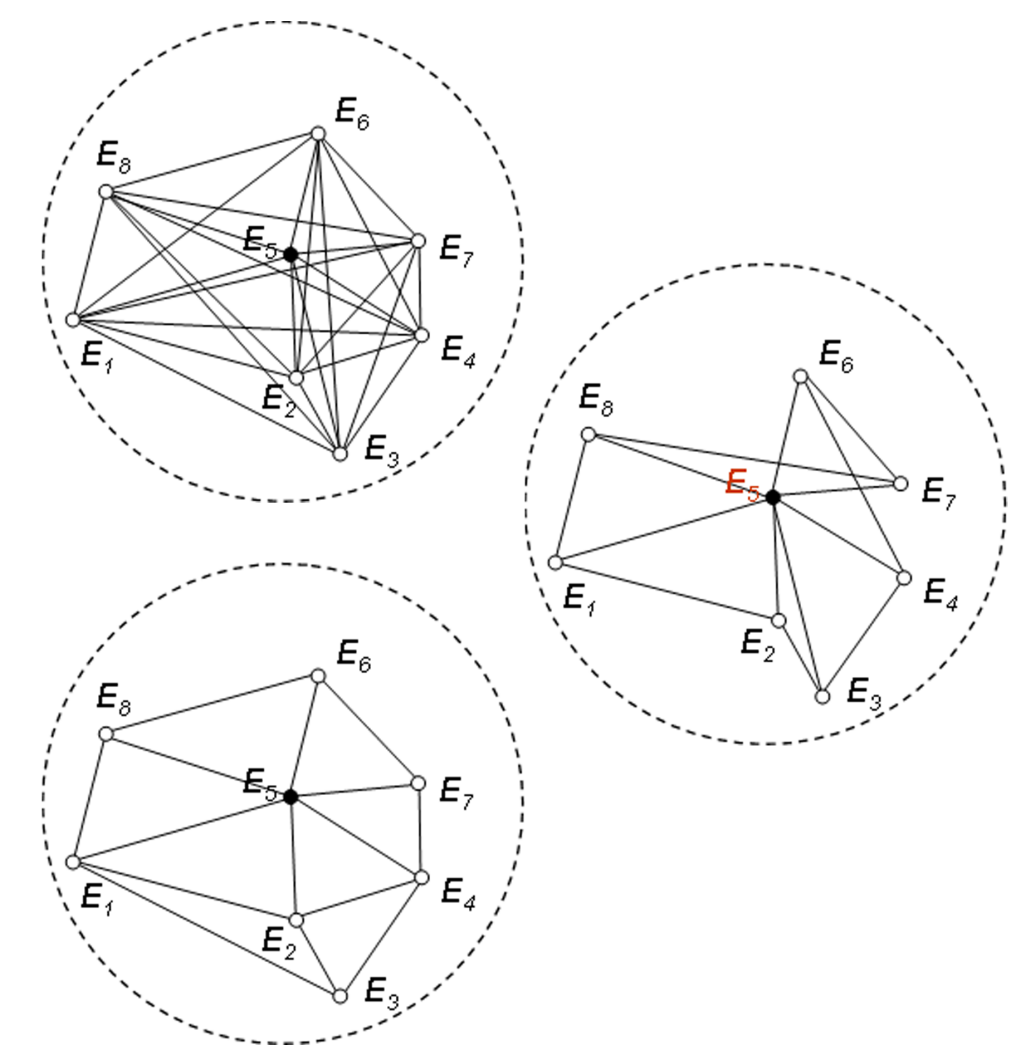
Key words

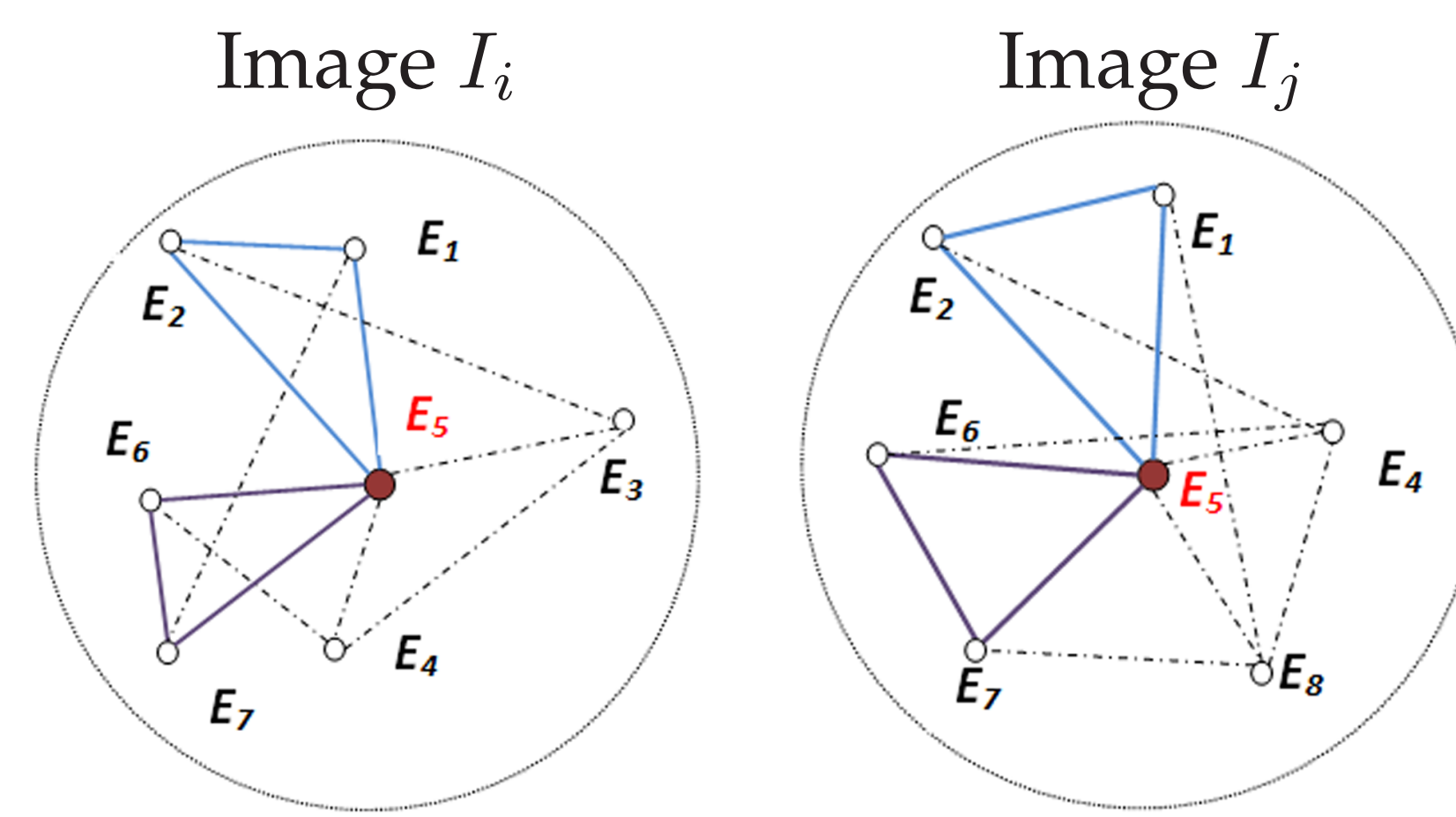CBIR, Spatial relationships, Local image features, Scalability

Δ-TSR

$$\Delta\text{-TSR}(I)=\{S(E_i, E_j, E_k)/E_i, E_j, E_k \in I;$$
$$i, j, k \in [1, N_I]; \ L_i \geq L_j \geq L_k\}$$
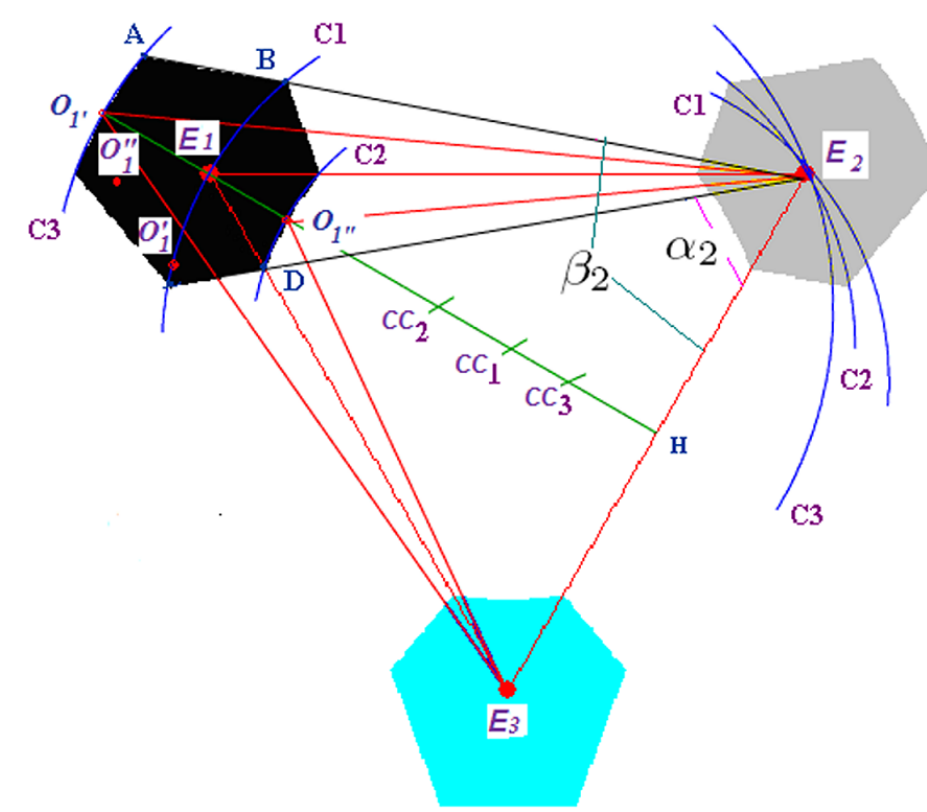
Prunning strategies

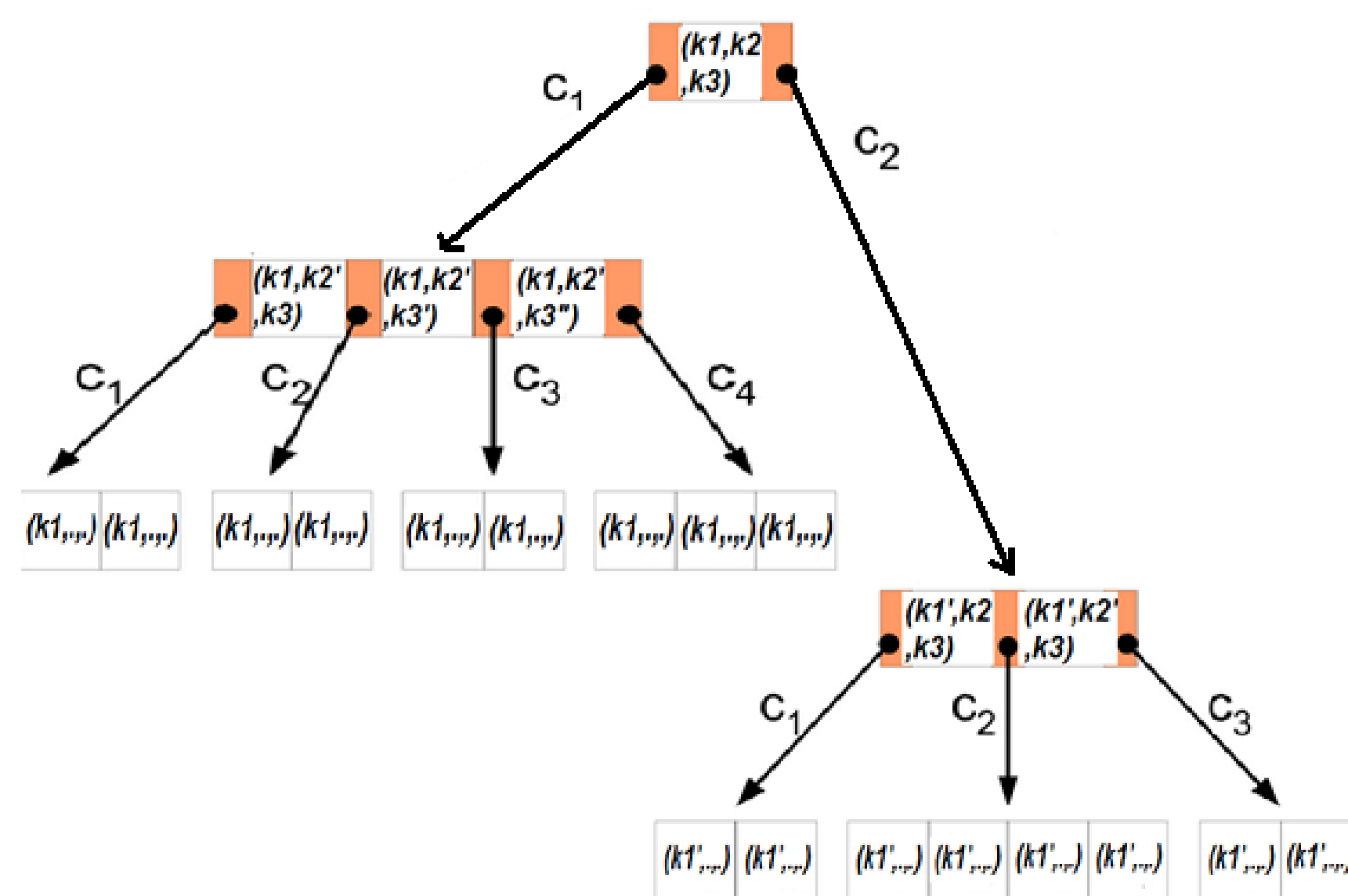## Matching example with strategy $SL_{sem+cur}$ and $\delta_a = 26$

Image I_i Image I_j

The two plain triangles (E_1, E_2, E_5) and (E_5, E_6, E_7) satisfy the Δ-TSR constraints. Note that E_4 significantly moves in I_i and I_j while all other points slightly move and that E_3 disappeared and E_8 appeared in image I_j.
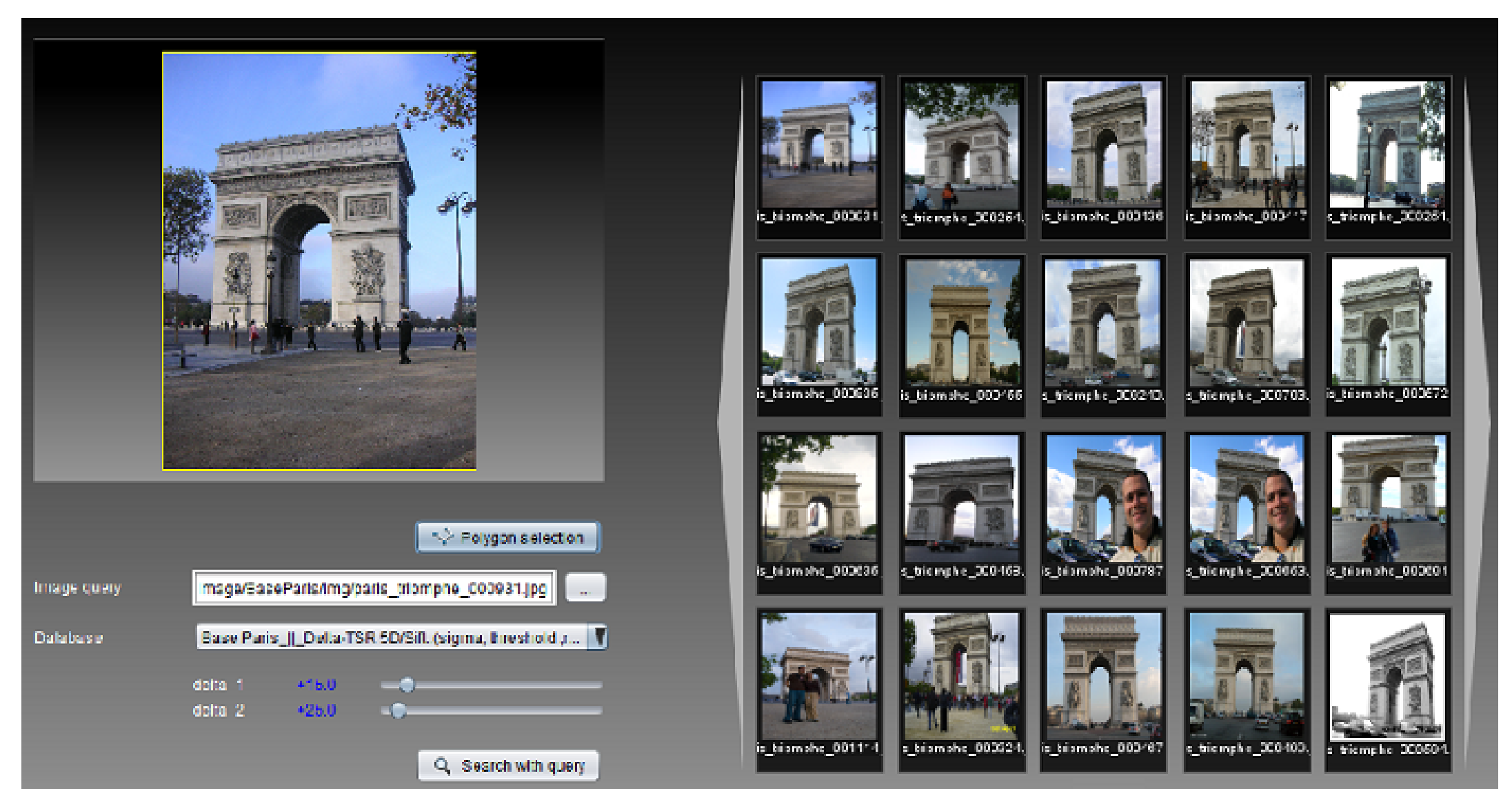
Application

Image database $\Longrightarrow$ Index structure $\Longrightarrow$ Application and query by example

References

[1] Hoang N.V., Gouet-Brunet V., Rukoz M., Manouvrier M., "Embedding spatial information into image content description for scene retrieval", in *Pattern Recognition*, 2010

[2] Hoang N.V., Gouet-Brunet V., Rukoz M., Manouvrier M., "Δ-TSR: a description of spatial relationships between objects for image retrieval", *Research report, LAMSADE, Paris-Dauphine University*, 2009

Acknowledgements