

Analysis of Image Transforms for Sketch-based Retrieval

Diploma Thesis

Felix Stürmer

Technische Universität Berlin
Fakultät IV - Elektrotechnik und Informatik
Computer Graphics

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Outline

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- Challenges of CBIR

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Motivation

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Challenges of CBIR

The Semantic Gap

*“The semantic gap is the **lack of coincidence** between the information that one can extract from the **visual data** and the **interpretation** that the same data have for a user in a given situation.” – Smeulders et al.*

The Sensory Gap

*“The sensory gap is the gap between the **object in the world** and the information in a (computational) description derived from a **recording of that scene**.” – Smeulders et al.*

Prior Work on Human Recognition

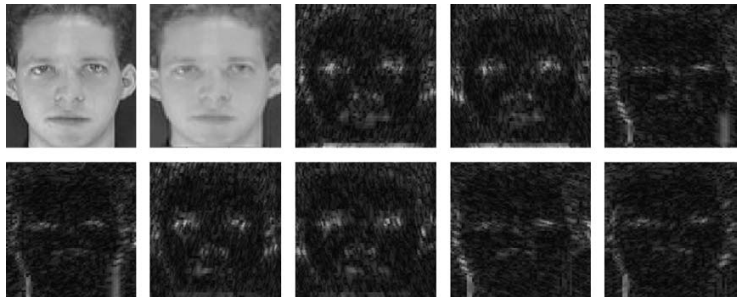


Figure: “Face recognition using curvelet based PCA.”, T. Mandal and Q. M.J Wu, ICPR 2008

Prior Work on Human Recognition



Figure: “Histograms of oriented gradients for human detection”, Dalal and Triggs, CVPR 2005

Prior Work on Visual Codebooks

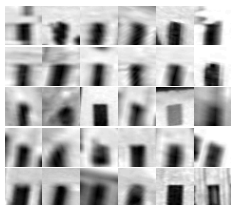
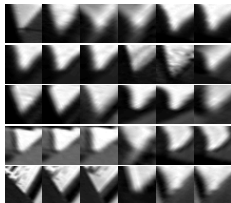


Figure: “Video Google: A text retrieval approach to object matching in videos”, Sivic and Zisserman, ICCV 2003

Prior Work on Scene Classification

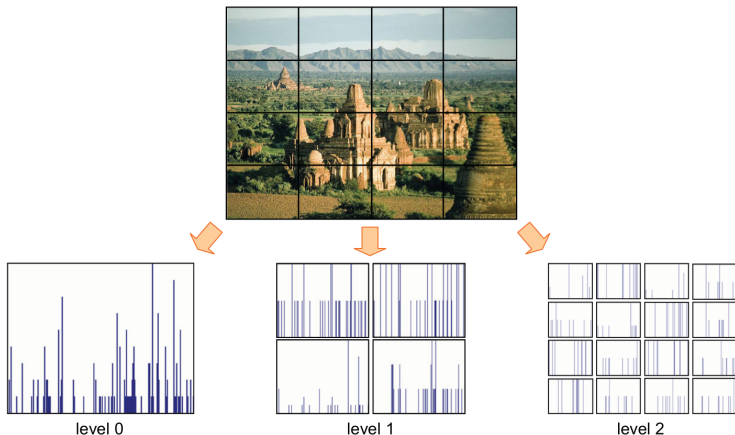


Figure: “Spatial pyramid matching”, Lazebnik et al., 2009

Anatomy of a CBIR System

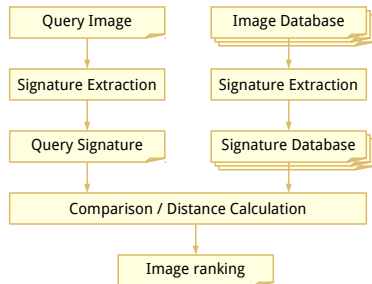


Figure: Global Descriptors

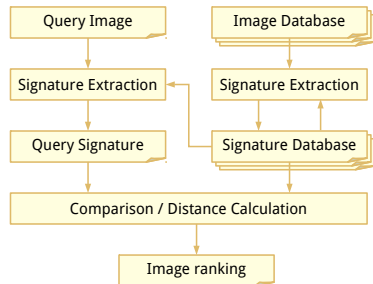
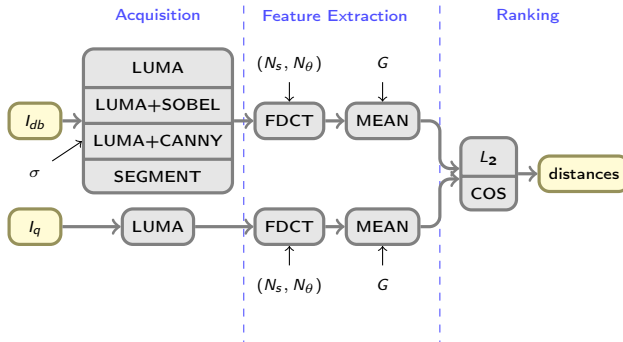
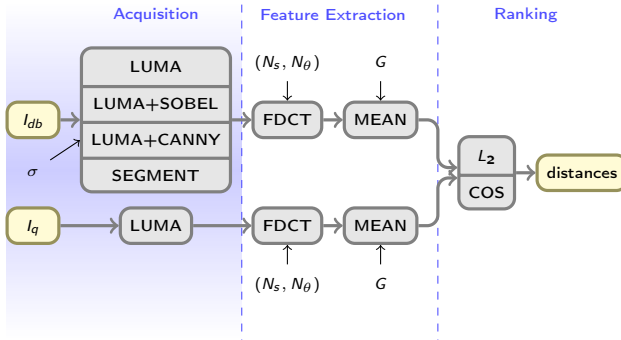


Figure: Local Descriptors

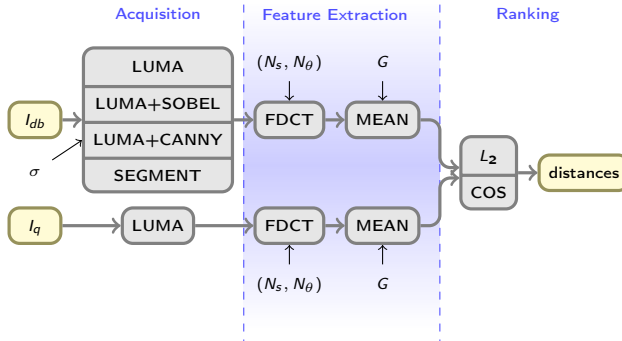
Proposed Retrieval Pipelines (Global)



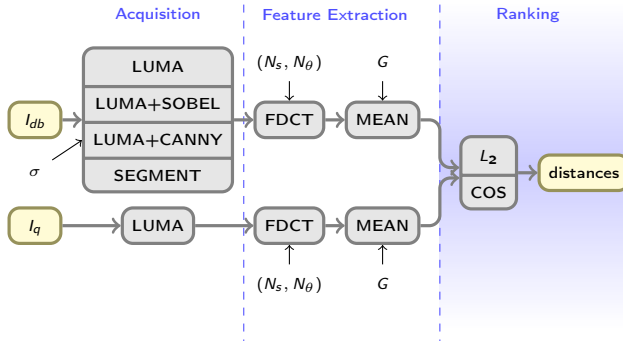
Proposed Retrieval Pipelines (Global)



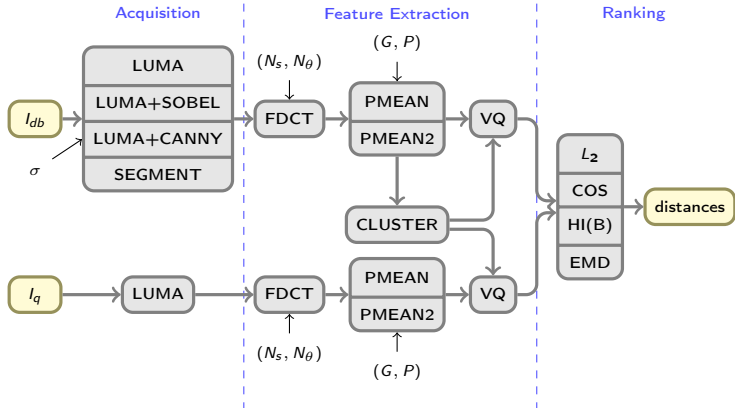
Proposed Retrieval Pipelines (Global)



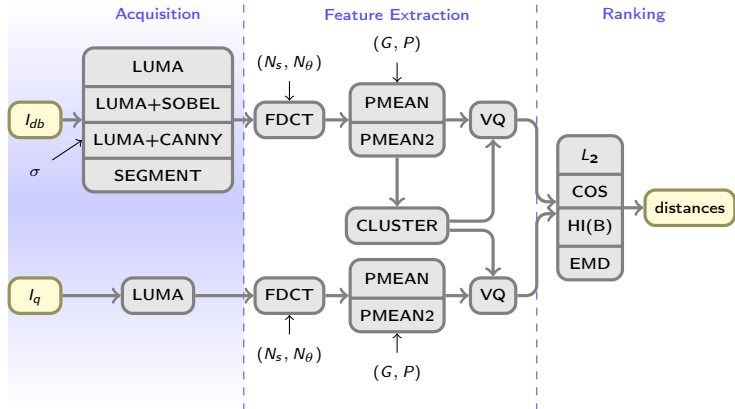
Proposed Retrieval Pipelines (Global)



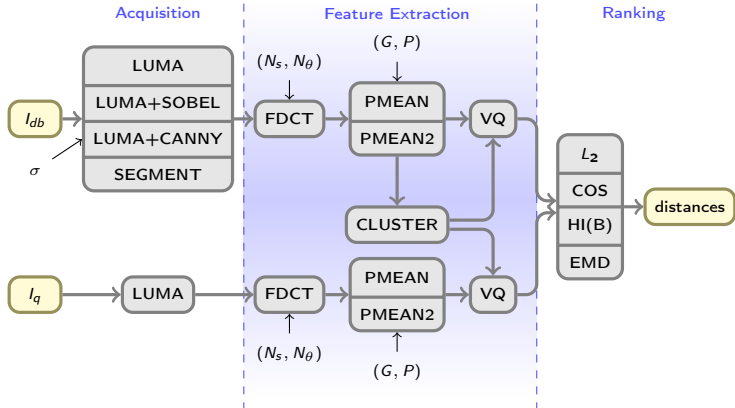
Proposed Retrieval Pipelines (Local)



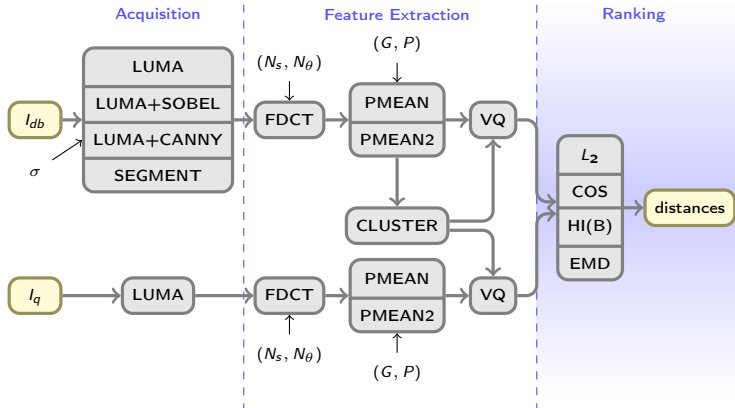
Proposed Retrieval Pipelines (Local)



Proposed Retrieval Pipelines (Local)



Proposed Retrieval Pipelines (Local)



Acquisition

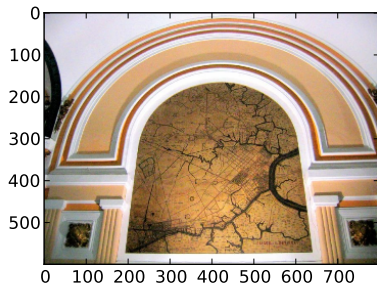


Figure: Original Image

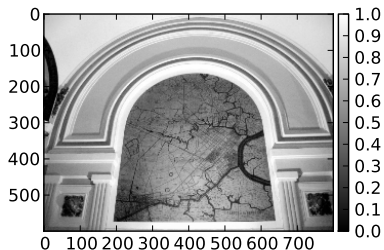


Figure: Luma Conversion

Acquisition

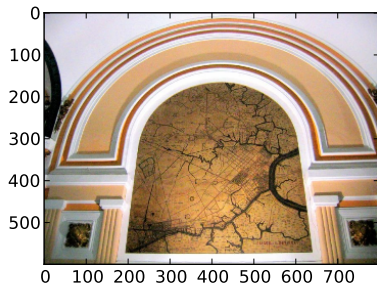


Figure: Original Image

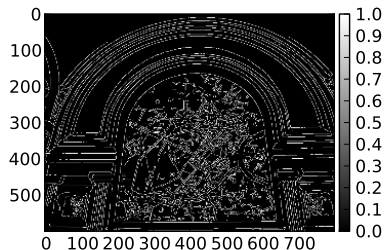


Figure: Canny Operator

Acquisition

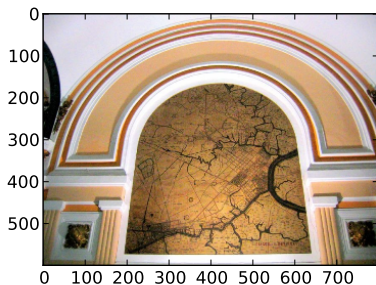


Figure: Original Image

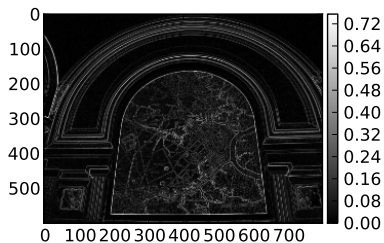


Figure: Sobel Operator

Acquisition

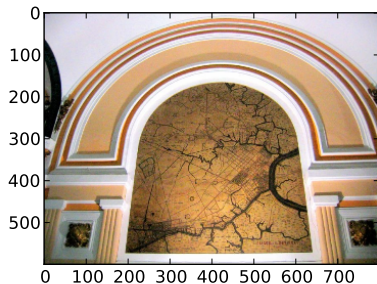


Figure: Original Image

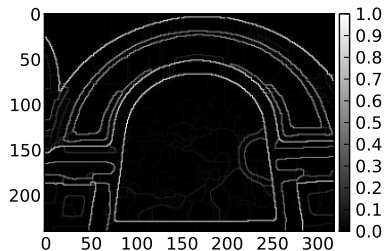


Figure: gPb-owt-ucm Transform

The Curvelet Transform

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The Fast Discrete Curvelet Transform

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Global Feature Extraction

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Local Feature Extraction

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Ranking

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Benchmarking Method

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Cross-Domain Results

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Intra-Domain Results

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Conclusions

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