Analysis of Image Tranforms for Sketch-based Retrieval

Diploma Thesis

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Outline

Motivation

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Introduction and Background	Proposed Solution	Results	Conclusions
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Motivation and Challenges of CBIR

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.

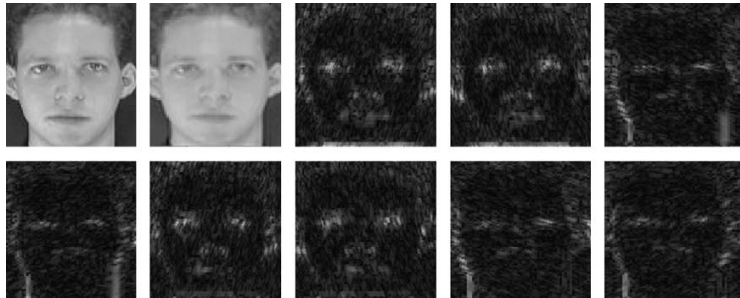| Introduction and Background	Proposed Solution	Results	Conclusions
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Prior Work

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
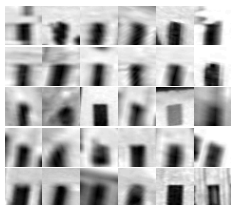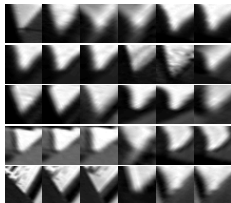
Prior Work on Visual Codebooks

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

Prior Work on Scene Classification
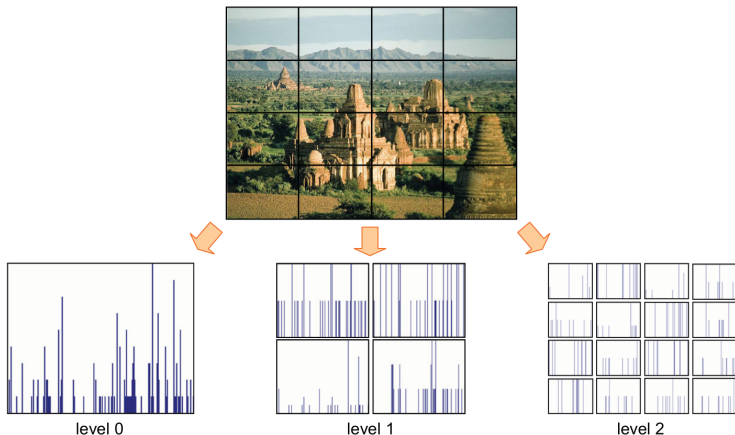
Figure: "Spatial pyramid matching", Lazebnik et al., 2009
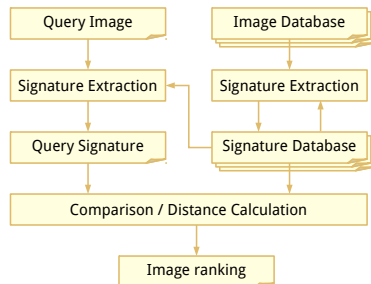
Anatomy of a CBIR System
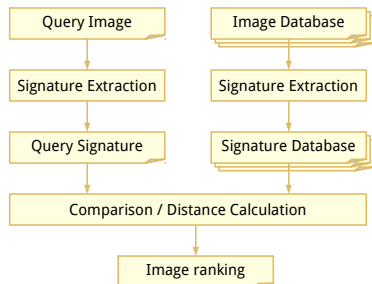
Figure: Global Descriptors

Figure: Local Descriptors

Proposed Retrieval Pipelines (Global)

Proposed Retrieval Pipelines (Local)

Acquisition
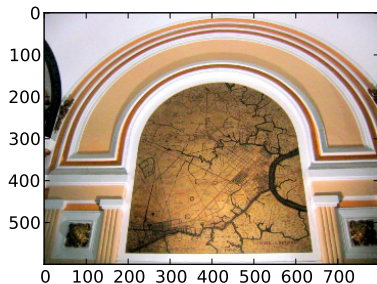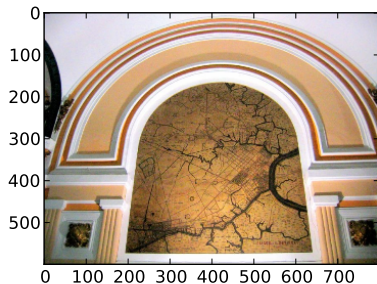

Figure: Original Image
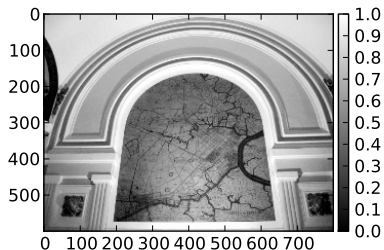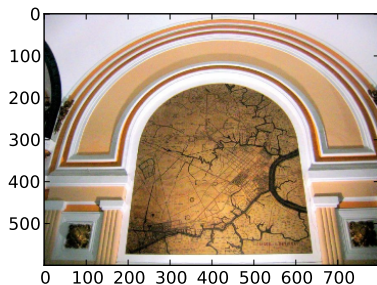

Figure: Luma Conversion

Acquisition

Figure: Original Image
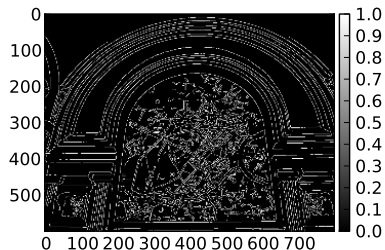
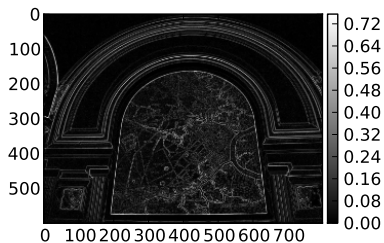Figure: Canny Operator

Acquisition

Figure: Original Image

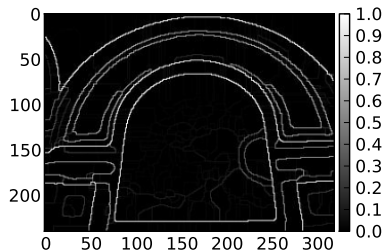Figure: Sobel Operator

Acquisition
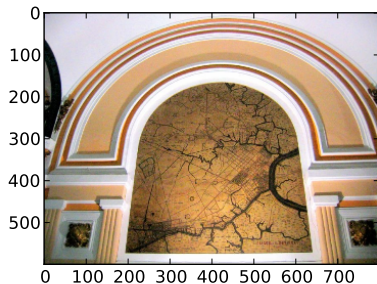
Figure: Original Image

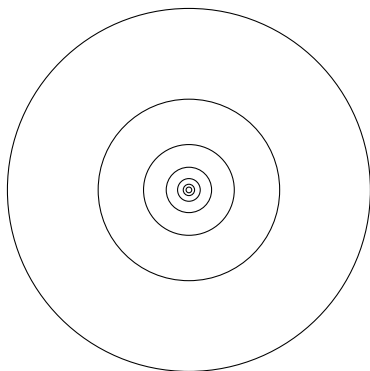Figure: gPb-owt-ucm Transform

The Curvelet Transform

Figure: Frequency Domain
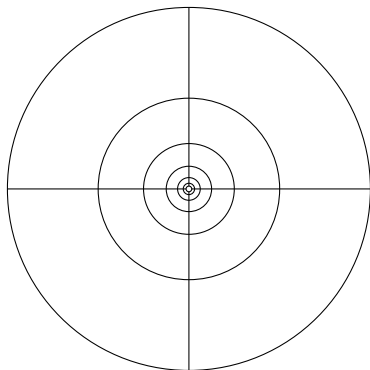
Figure: Spatial Domain

The Curvelet Transform

Figure: Frequency Domain
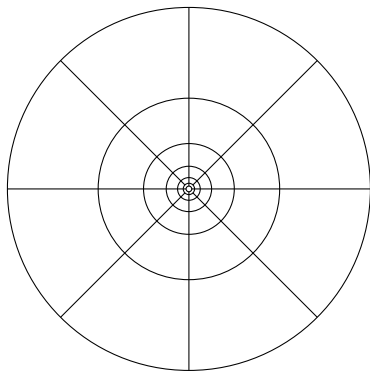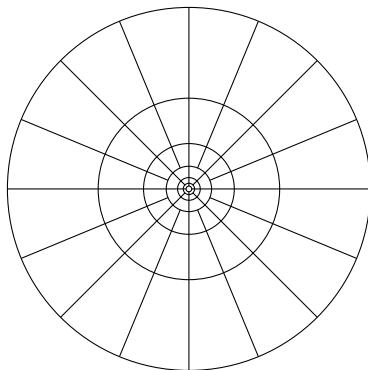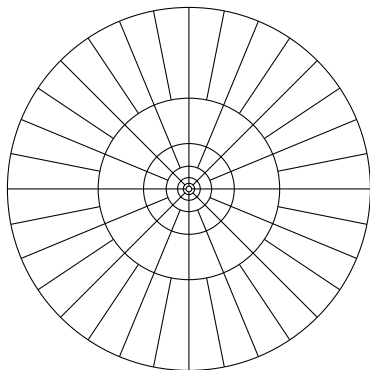
Figure: Spatial Domain

The Curvelet Transform

Figure: Frequency Domain

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The Curvelet Transform

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The Curvelet Transform

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Figure: Spatial Domain

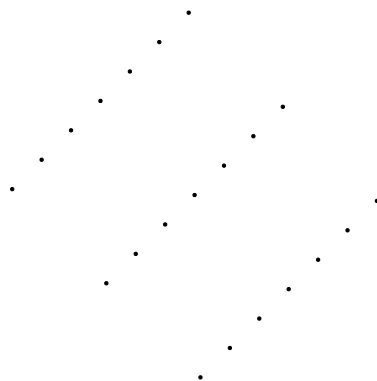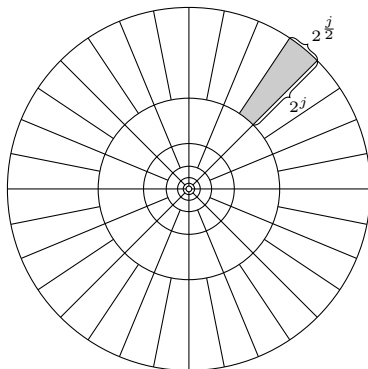# The Curvelet Transform
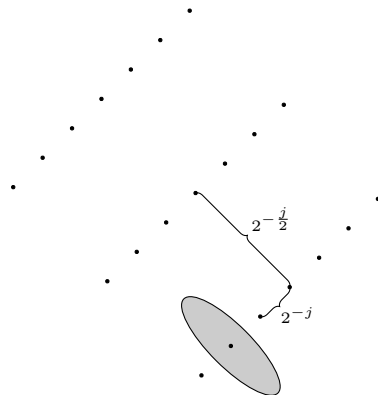

Figure: Frequency Domain

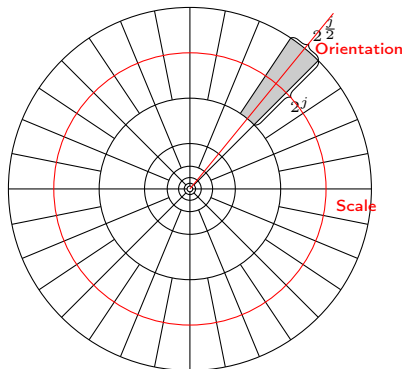Figure: Spatial Domain

The Curvelet Transform

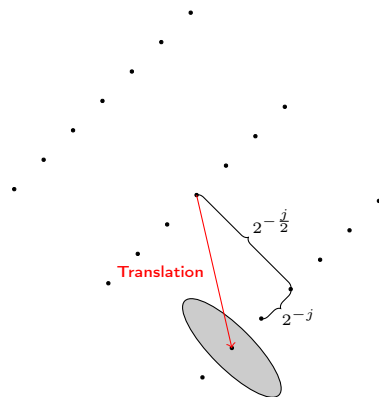Figure: Frequency Domain

Figure: Spatial Domain

The Fast Discrete Curvelet Transform

Figure: Frequency Domain

Figure: Parallelogram Support

The Fast Discrete Curvelet Transform

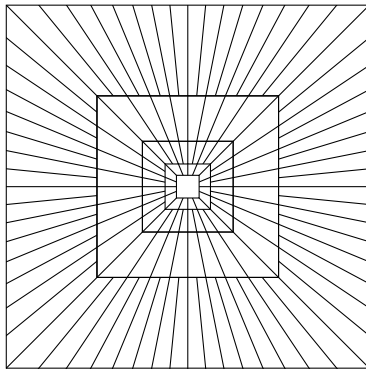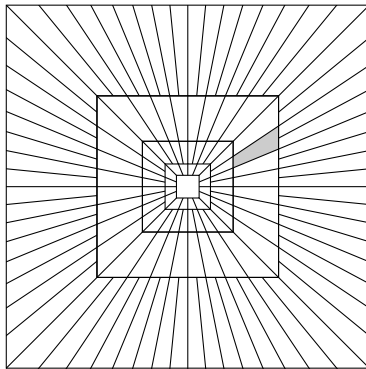Figure: Frequency Domain

Figure: Parallelogram Support

The Fast Discrete Curvelet Transform
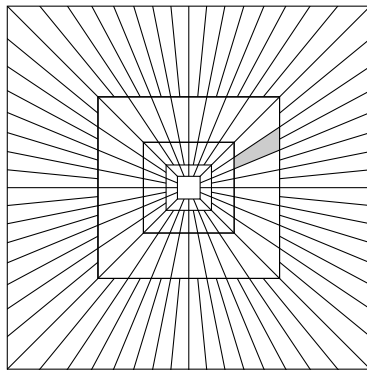

Figure: Frequency Domain

Figure: Parallelogram Support

The Fast Discrete Curvelet Transform

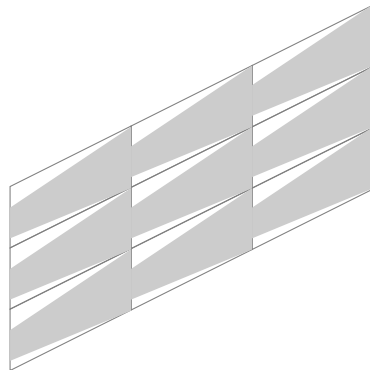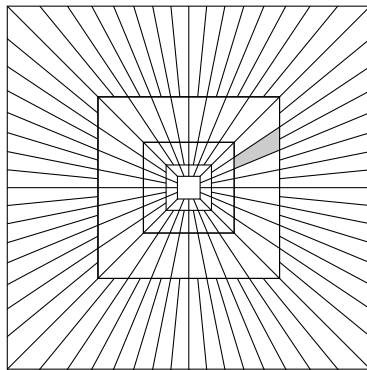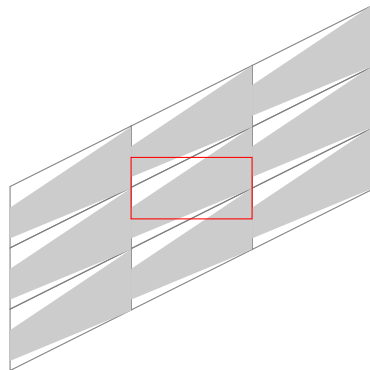

Figure: Frequency Domain

Figure: Parallelogram Support

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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