# 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.
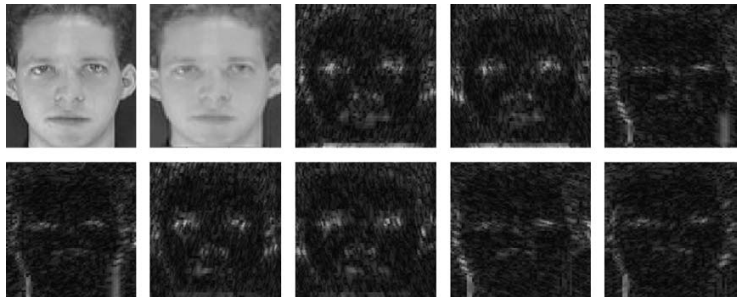
## Prior Work on Human Recognition



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

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Prior Work

## Prior Work on Human Recognition



Figure: "Histograms of oriented gradients for human detection", Dalal and Triggs, CVPR 2005
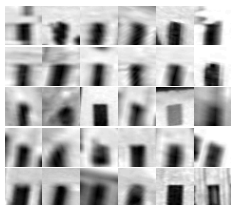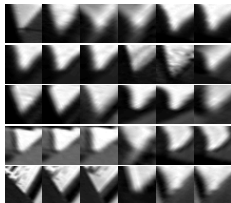
# Prior Work on Visual Codebooks





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

# Prior Work on Scene Classification
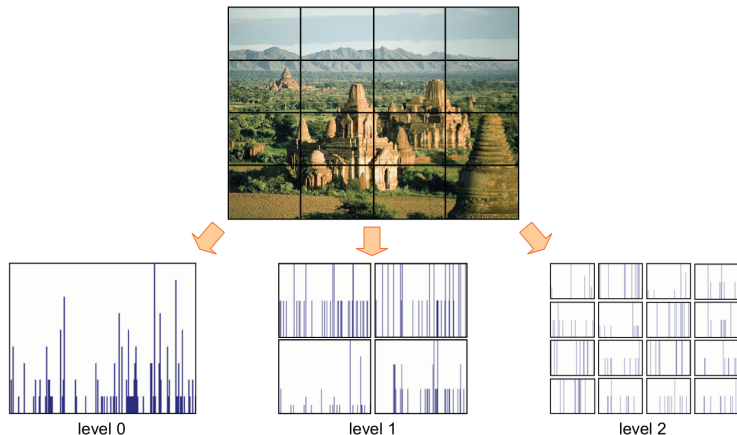


Figure: "Spatial pyramid matching", Lazebnik et al., 2009

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Anatomy of a CBIR System

# Anatomy of a CBIR System
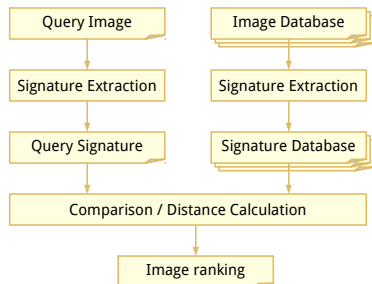


Figure: Global Descriptors
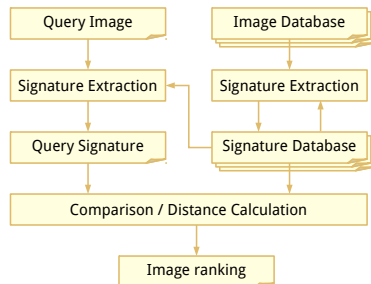
Figure: Local Descriptors

# Proposed Retrieval Pipelines (Global)

# Proposed Retrieval Pipelines (Local)

# Acquisition
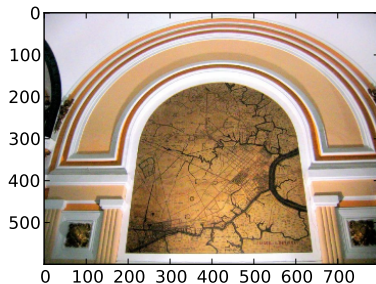


Figure: Original Image
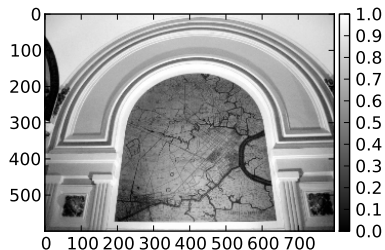


Figure: Luma Conversion

# Acquisition
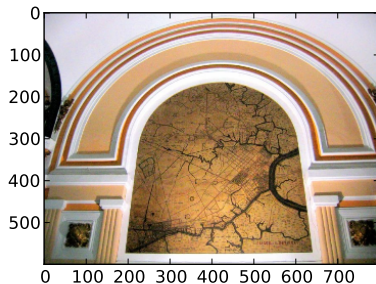


Figure: Original Image
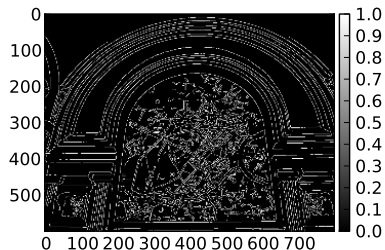


Figure: Canny Operator

# Acquisition
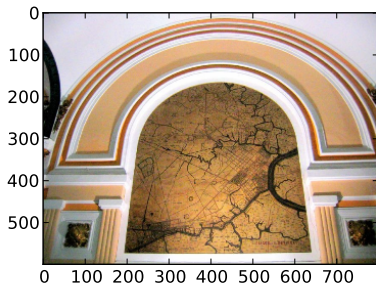


Figure: Original Image
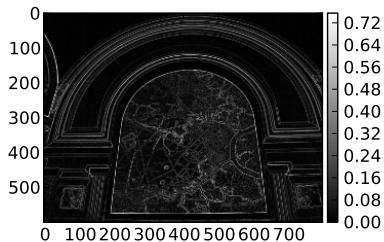


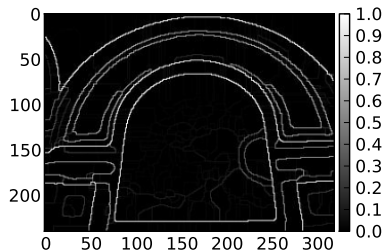Figure: Sobel Operator
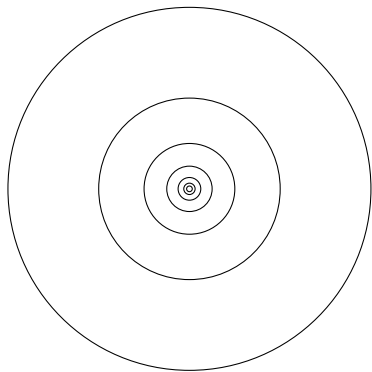
# Acquisition
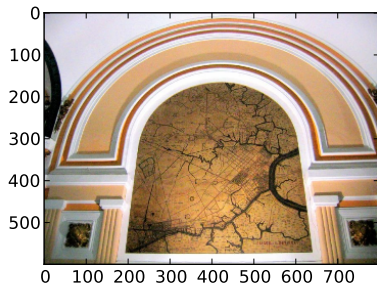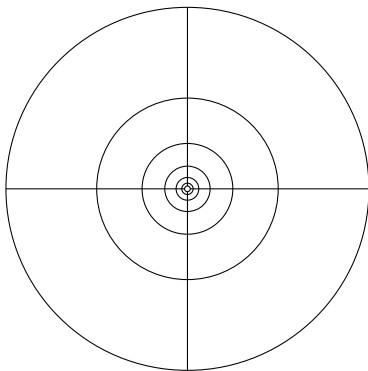


Figure: Original Image



Figure: gPb-owt-ucm Transform
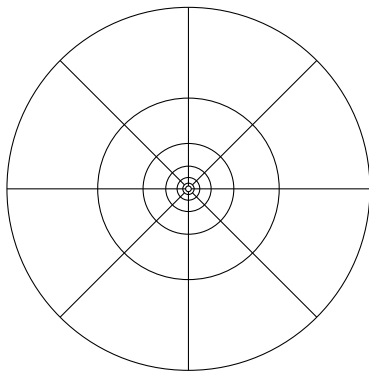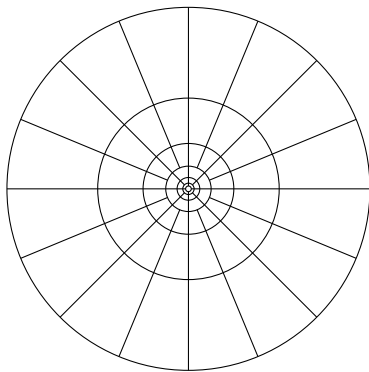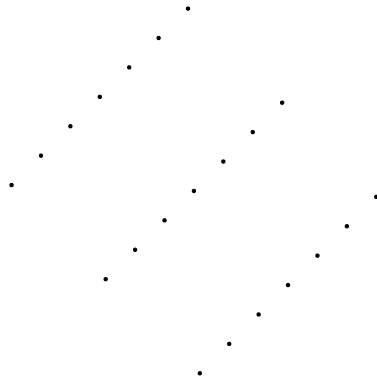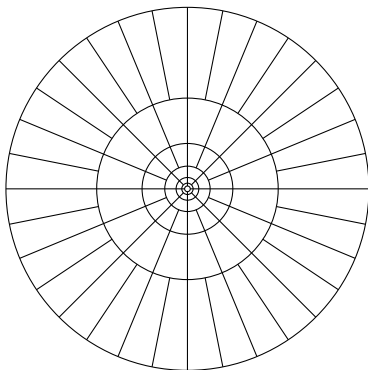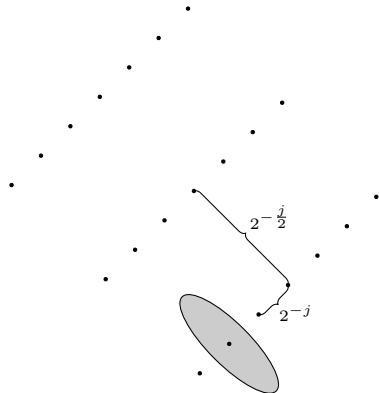
# The Curvelet Transform
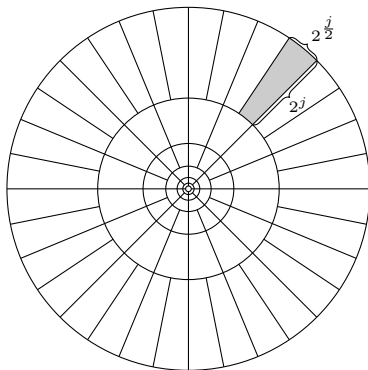
# The Curvelet Transform

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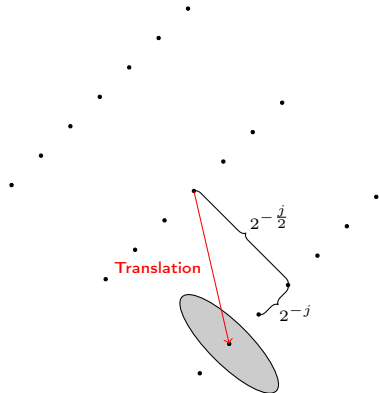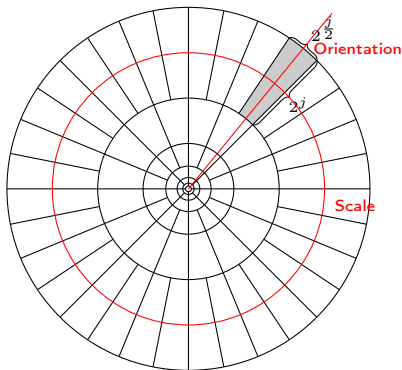
# The Curvelet Transform
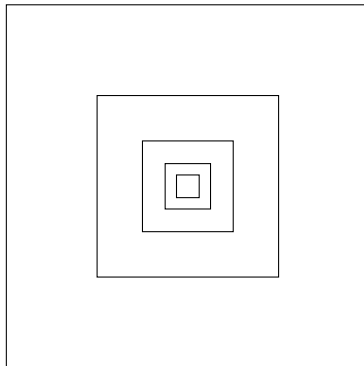
# The Curvelet Transform

# The Curvelet Transform

# The Curvelet Transform

# The Fast Discrete Curvelet Transform

# 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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