

# Robust Scene Categorization by Learning Image Statistics in Context for BBC rushes

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# Overview

## Introduction

## Visual Features

## Contextures

## Evaluation

## Conclusions

- Visual Concepts by Scene Recognition

- How to recognize an airplane?

Context!



- Use Proto-Concepts to Describe Context

- SVM: link Context to Concepts

- Learn Models on News data, evaluate on BBC rushes

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Robust Scene  
Categorization by  
Learning Image  
Statistics in Context



# Low Level Features

- Color Invariance

Introduction

Visual Features

Contextures

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Conclusions



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# Natural Image Statistics

- There are more non-edges than edges

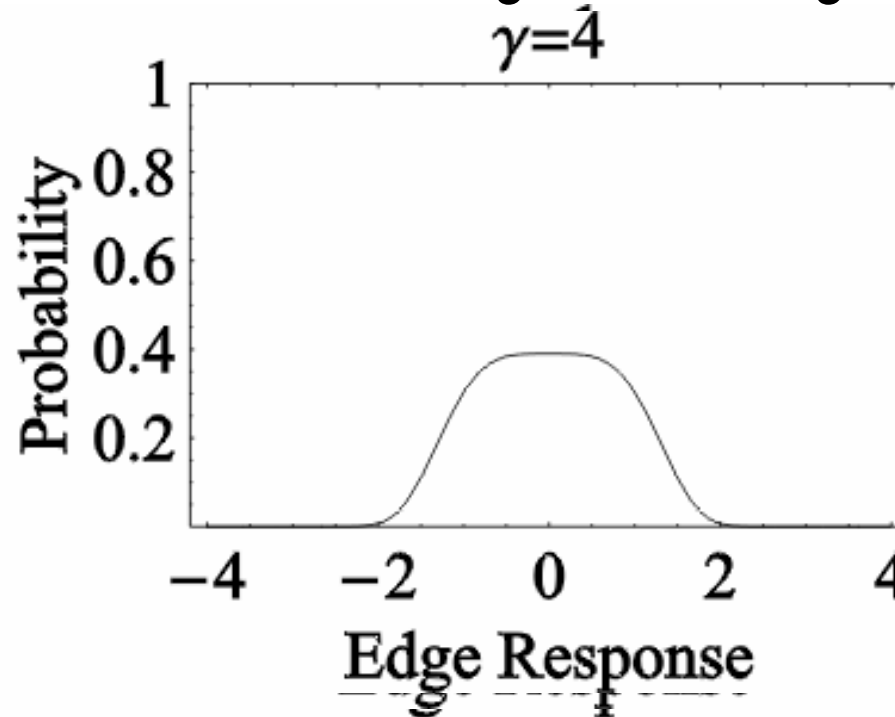
Introduction

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- Distribution of Edge responses: Integrated Weibull

$$\frac{\gamma}{2\gamma^{1/\gamma}\Gamma(\frac{1}{\gamma})} \exp\left(-1\frac{1}{\gamma}\left|\frac{r-\mu}{\beta}\right|^\gamma\right)$$

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# Proto-Concepts

Introduction

Visual Features

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Conclusions

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Flag\_USA



Building (321)  
Car (192),  
Charts (52)  
Crowd (270)  
Desert (82)  
Fire (67)  
Flag\_USA (98)  
Maps (44)  
Mountain (41)  
Road (143)  
Sky (291)  
Smoke (64)  
Snow (24),  
Vegetation (242)  
Water (108)

In brackets: nr. Annotations  
at least 20 frames



# Region Detection

Introduction

Visual Features

Contextures

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Conclusions



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# Contextures

- Contexture: Occurrence Histogram of Proto-Concepts

Introduction

Visual Features

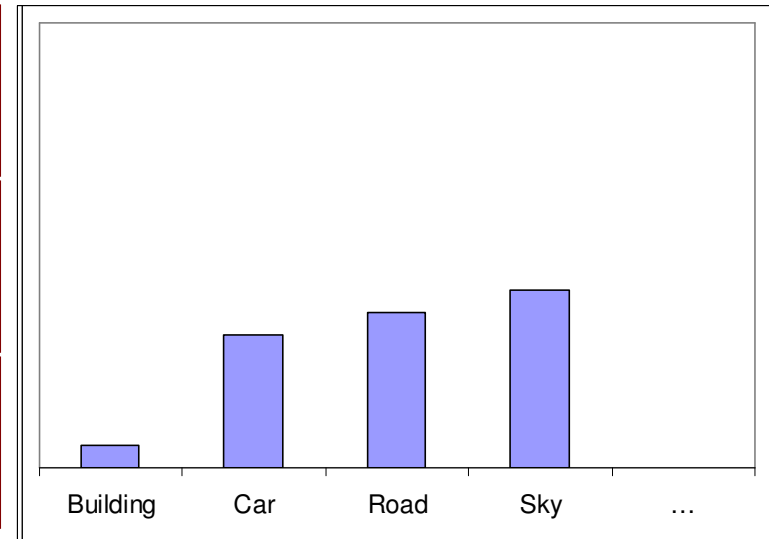
**Contextures**

Evaluation

Conclusions

Global (Accumulate)

Local (Arg Max)



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## Accumulate

## Arg Max



# Learning Concepts in Video

Introduction

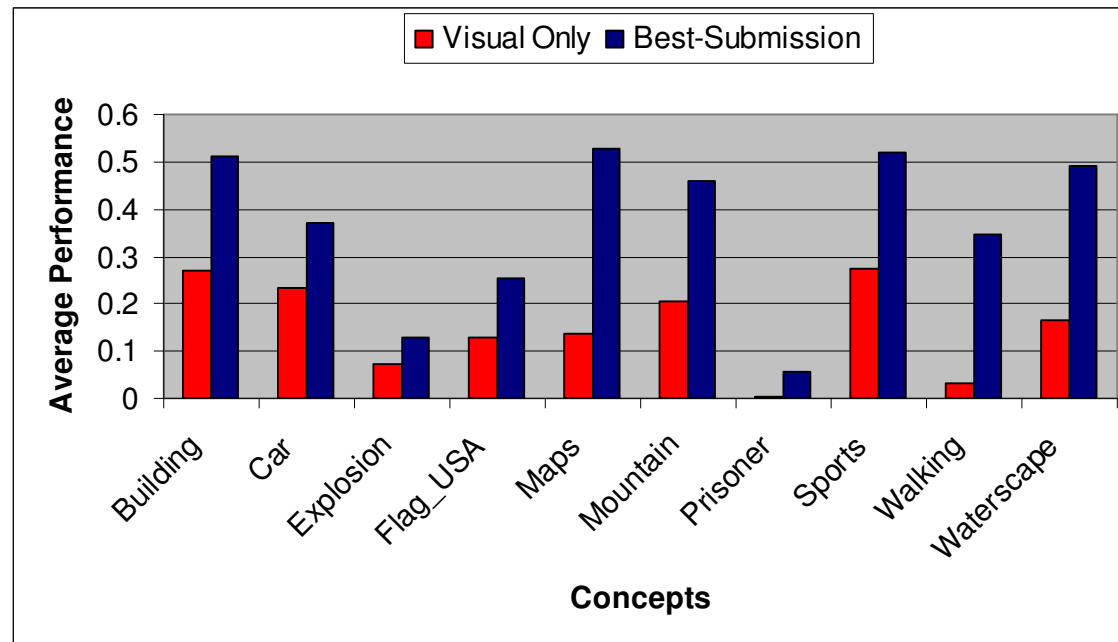
Visual Features

Contextures

Evaluation

Conclusions

- Image to Shot: sample every second.
- Use SVM to link Contextures to 101 Concepts
- Performance on TrecVid Testset



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# BBC Rushes

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Introduction

Visual Features

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Conclusions

- Evaluate the SVM-models trained on TRECVID data on the BBC rushes
- 25 ‘survive’:
  - aircraft, bird, boat, building, car, charts, cloud, crowd, face, female, food, government building, grass, meeting, mountain, outdoor, overlaid text, sky, smoke, tower, tree, urban, vegetation, vehicle, waterscape

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Robust Scene  
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# BBC rushes Screenshots (I)

Introduction

Visual Features

Contextures

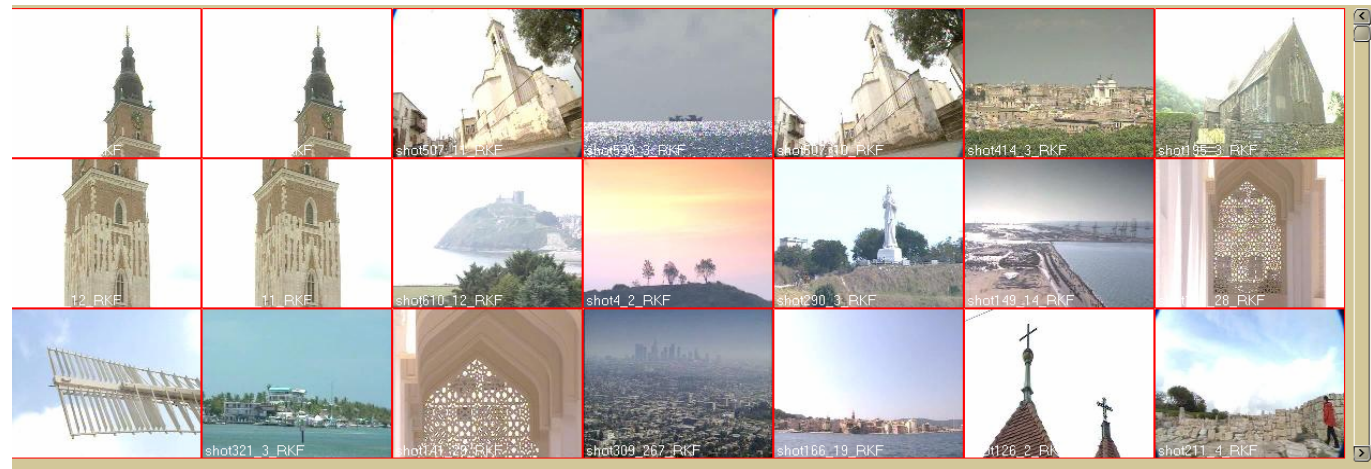
Evaluation

Conclusions

- Building



- Tower



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Robust Scene  
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# BBC rushes Screenshots (II)

Introduction

Visual Features

Contextures

Evaluation

Conclusions

- Face



- Food



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Robust Scene  
Categorization by  
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# Conclusions & Discussion

**Introduction**

**Visual Features**

**Contextures**

**Evaluation**

**Conclusions**

- Does a picture say more than a thousand words?
  - According to our Trec results: Not (yet)
- Robust methods provide a rich untapped information source:
  - Re-use of annotations
  - Re-use of Training Models
  - Ideally: train a concept once, apply everywhere

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Robust Scene  
Categorization by  
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