Visual Computing

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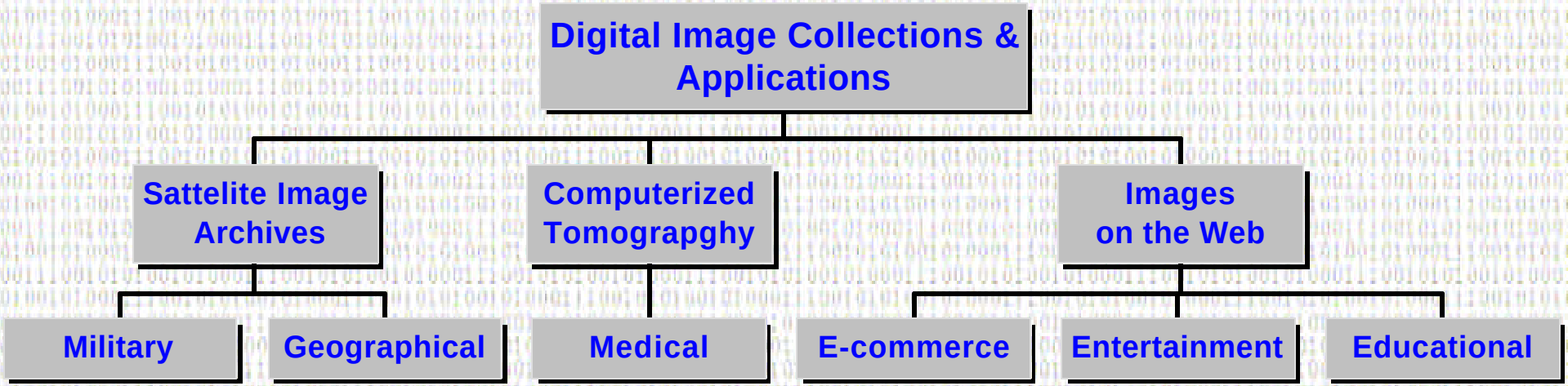
Outline

- Content-based Image Retrieval
  - Motivation and Goal
  - Problem Statement
  - Current and Future Projects
- Data Mining Projects

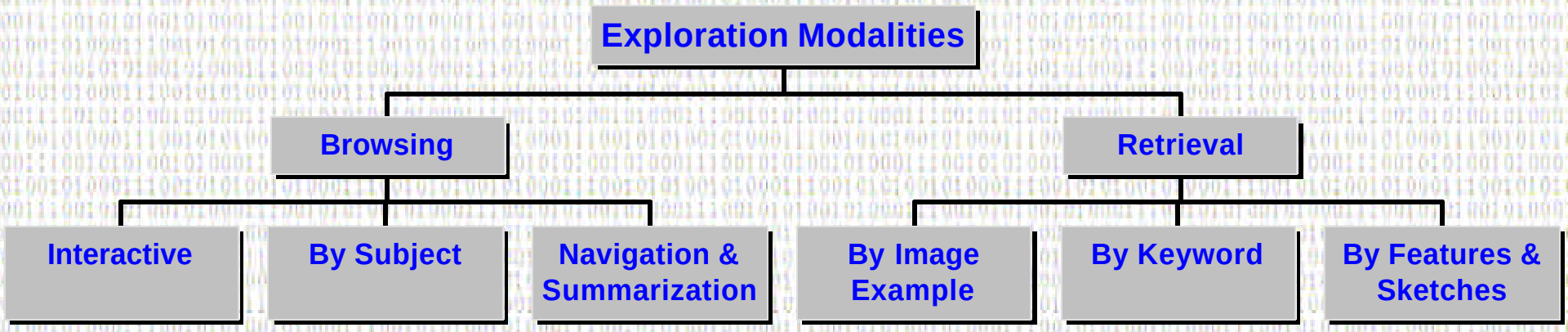
Motivation & Goal

The growth of digital imaging



Motivation & Goal (cont.)

The need for data management



- **Humans tend to use semantic concepts when querying and browsing multimedia databases.**

Motivation & Goal (cont.)

External sources of information about images

High-level features:
-Keywords

Learned visual Concept: 'sunset'

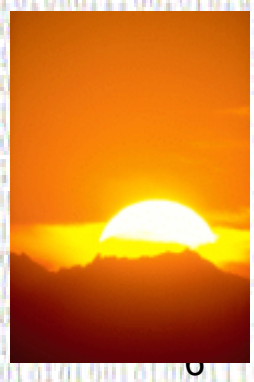
Text from:
-Captions
-Transcripts
-Close Captioning
-Verbal description

Automatic or semi-automatic generation of keywords for images from their visual content

Text from:
-Manual Indexing

Internal sources of information:

Low-level features:
-Color
-Shape
-Texture



Problem Statement

Image retrieval systems that permit image searching based on features automatically extracted from the images' own visual content are *called content-based image retrieval (CBIR) systems.*

-***visual features***
(primitive or low-level image features)

Domain-specific features:
- fingerprints, human faces

General features:
- ***color***, texture, shape

Drawback:-lack of expressive power

Problem Statement

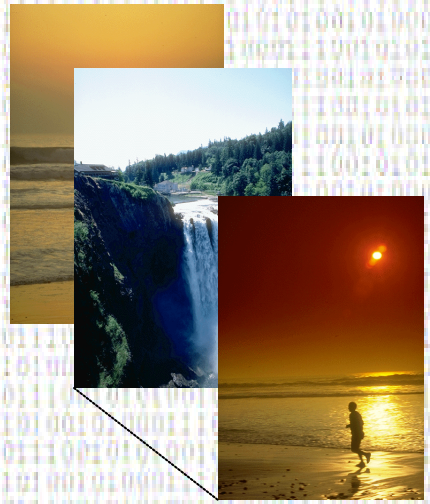
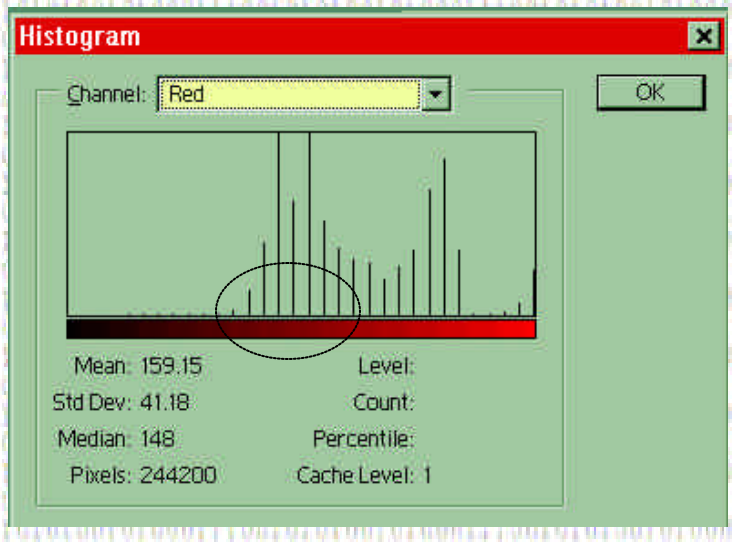


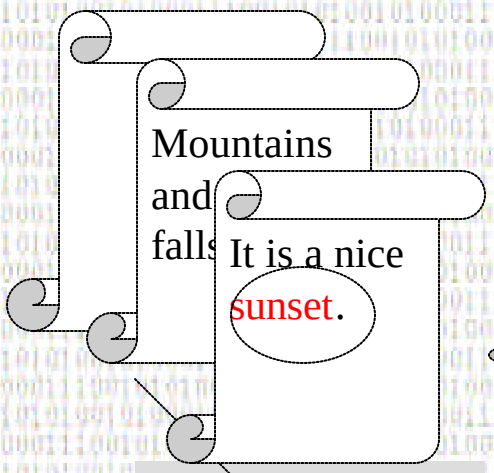
Image Database

Feature Extraction



Semantic Gap

?



Text Database

Meaning: Sunset

Current and Future Projects

Color and Shape-based Image Retrieval


18,837


1,2035

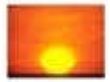

20,23


19,290


12,1296


2,595


30,193


11,1701


7,633


26,39


22,878


28,1115


9,2060


3,1460


23,990


6,769
4,199


27,364


14,1561
25,799


29,1785


8,964


15,2080


10,1431


21,1348

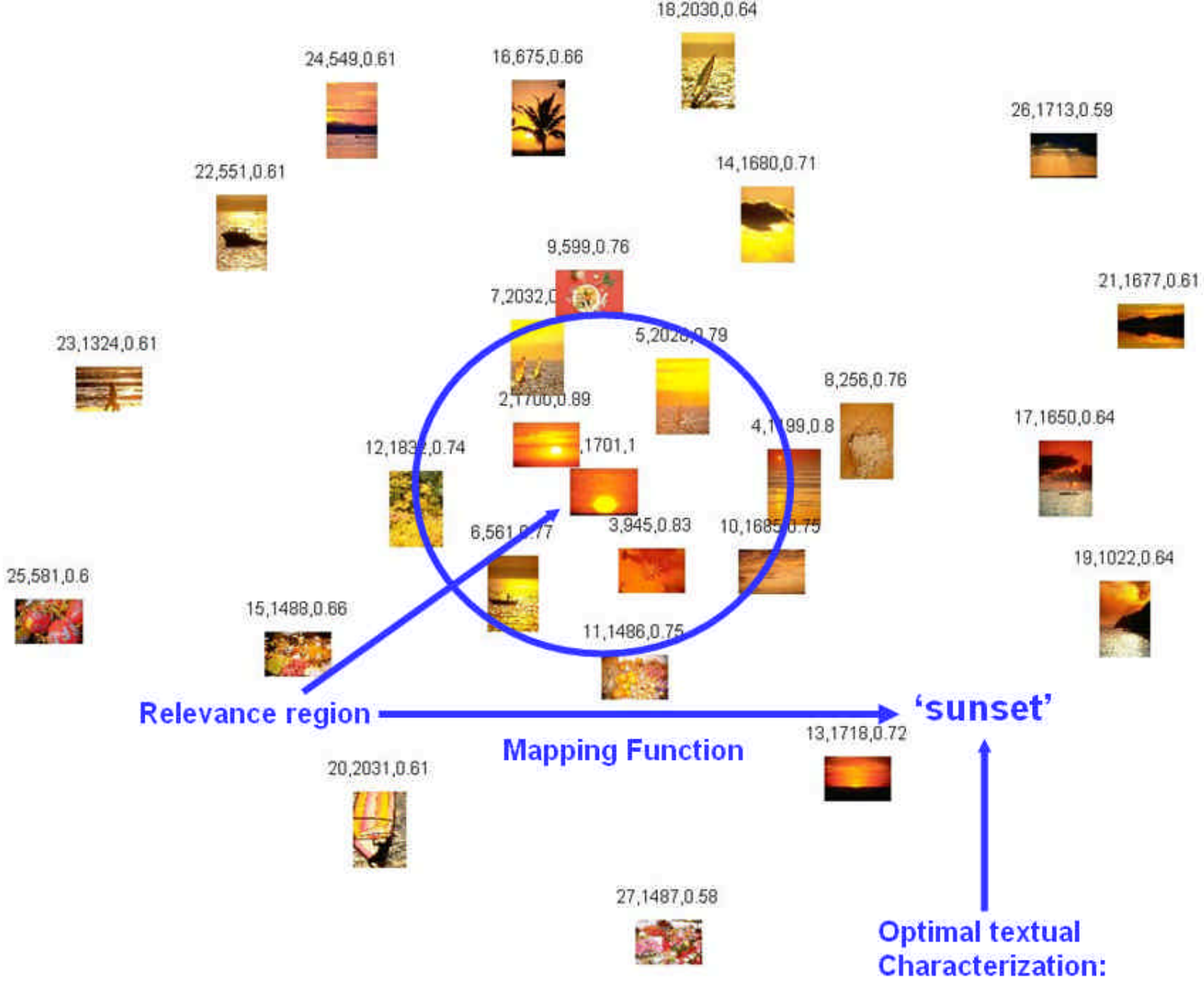

16,1803


24,1317


5,1399


17,251


13,475


18,2030,0.64
24,549,0.61
16,675,0.66
26,1713,0.59
22,551,0.61
14,1680,0.71
9,599,0.76
21,1677,0.61
23,1324,0.61
5,2028,0.79
8,256,0.76
17,1650,0.64
12,1832,0.74
3,945,0.83
19,1022,0.64
25,581,0.6
15,1488,0.66
11,1486,0.75
Relevance region
'sunset'
Mapping Function
13,1718,0.72
20,2031,0.61
27,1487,0.58
Optimal textual
Characterization:

Current and Future Projects

Color Patterns and Synobins

Color Patterns and Synobins

Bins representing different colors but when similarly used across the image database can be considered as synonymous with each other and the pattern that they define is the analogous of a concept from text retrieval.

	Text Example	Image Example
Same root/color used in different contexts	Doctor, Doctorate	
Different root/color used in same contexts	Doctor, Physician	

Future Projects

Narrative Description of Images

?

Face Recognition Applications

Data Mining Projects

➢ Using Data Mining for Target Marketing Efforts

Kansei Engineering: Mappings from image car characteristics to customer feelings/preferences

Vehicle Attributes	Anticipated Feelings
Adventurous	Accomplished
Aggressive	Acknowledged
Athletic	Anonymous
Long Lasting/Enduring Style	Confident/Capable
Exclusive	Cutting-edge
Family oriented	Free to do anything
Fast	In-control
Luxurious	Mainstream
Modern	Mentally/Physically Engaged
Muscular/Well-defined	Rewarded
Nostalgic	Sporty
Powerful	Tough
Sleek and Sexy	
Sophisticated	
Sporty	
Tough	

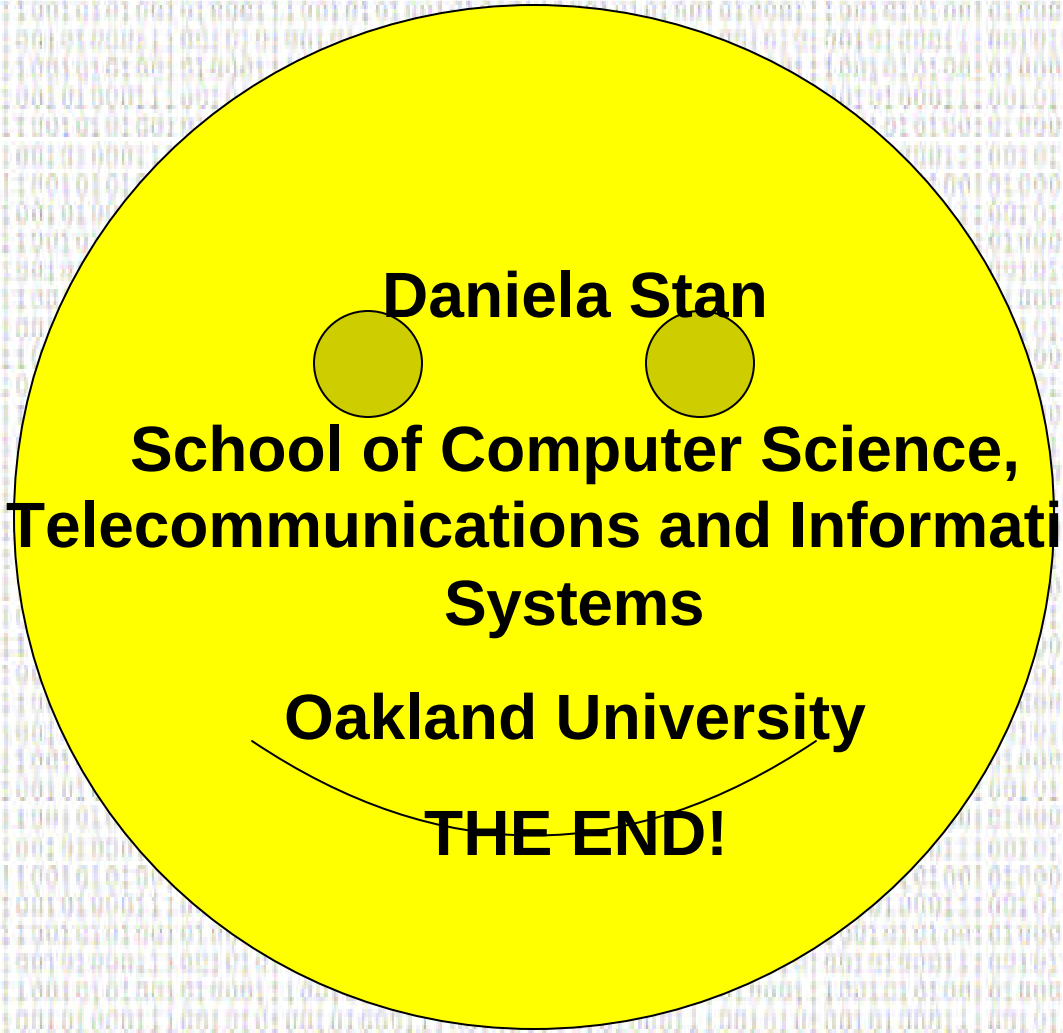
Target Customer Emotional Benefits

Personality Profile

- Tough
- Free to do anything
- In Control
- Confident

Data Mining Projects

- **Using Data Mining for Medical Applications**
  - **Prediction of high costly patients in the future for medical insurance company**
  - **Prediction of patients' readability for certain surgeries**
- **Using Data Mining for Stock Market and Investment**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THE END!