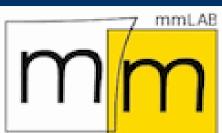
EVENT TYPE CLASSIFICATION FOR PERSONAL PHOTO ALBUMS BASED ON SIGNATURE IMAGE

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Abstract

Analyzing personal photo albums for understanding the conveyed events is an emerging trend. It can help to annotate events and their components in order to support for organizing and sharing the event-related information among the users. Therefore, having a fast event-type classifier for personal photo albums could be considered as a basic requirement. In this paper, a novel method for fast event-type classification of personal photo albums is presented. Distinct from previous approaches, the proposed method does not process photos of an event as individuals but as a whole by which not only 'gist' and 'saliency' but also time information are captured and represented as low-level features towards mimicking biological vision. To capture both 'gist' and 'saliency' of an event, a 2D histogram, called a GS-SIB, is created by extracting *dominant colors* and *salience map* from all photos, i.e., each photo is projected to a point of the GS-SIB image according to its dominant color and salience map pattern value. Photos is then sorted by time and built as a sequence of symbols, called a T-SIB. Each symbol and its order in T-SIB represent for photo coordinate in GS-SIB and *chronological order*, respectively. The weighted sum of the differences between GS-SIBs, and between T-SIBs is the discriminant value to classify event-type. A highly challenging database of 19.101 photos from five varied event-types was used for evaluating the performance. The experimental results show that the proposed method is capable of classifying with high accuracy and low computational cost when comparing to other methods.

Method overview GST-SIB of an event tv GS-SIB of an T-SIB Chronological Order Dominant Color Histogram GS-SIB T-SIB of an event type Saliency Histogram T-SIB Chronological Order **Comparing** GST-SIB of a photo album Dominant Color Histogram Even Type GS-SIB Photo Album Saliency Histogram T-SIB Chronological Order

How it works Color index: 37, Other photos Saliency index: ■ 0.015-0.02 **0.01-0.015 GS-SIB** ■ 0.005-0.01 ■ 0.03-0.04 ■ 0.02-0.03 **GS-SIB ■** 0.01-0.02 Color index: 32, Other photos Saliency index: 16 Chronological order (color₁, saliency₁); (color₂, saliency₂); ... Photo Album T-SIB (color₁, saliency₁); (color₂, saliency₂); ... Photo Album T-SIB Chronological order

Motivations

The motivation of the proposed method was inspired from the following criteria:

- **Gist, Saliency, and Time**: within a single glance of an image, human not only can understand a holistic scene but also can recognize several individual objects toward to interpret complex actions or social activities.
- **Common patterns**: when taking photos people prefer to take a series of images, that leads to the assumption that inside an episode of an event, there could be some common patterns.
- **Common semantics**: every real-life event itself contains a lot of implicit semantics by which human can understand the general content of event without explicit explanations. Therefore, similar event-types could contain some common semantics that need to be discovered.

Experimental Results

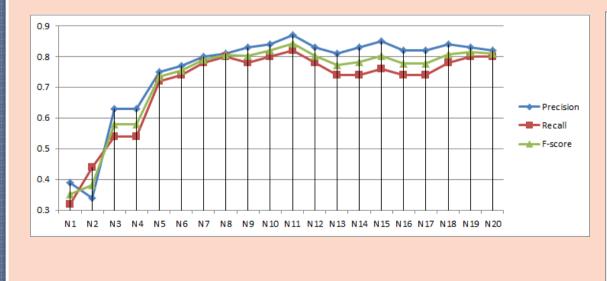
Discriminative: Diffusion matrix

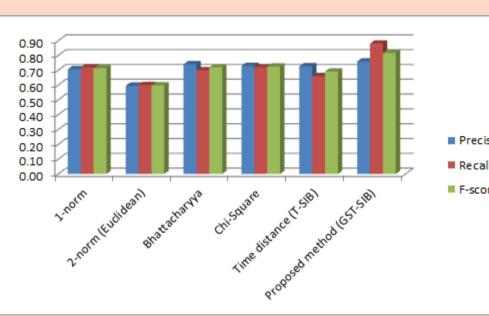
	BasketBall	Cricket	Graduation	Marriage	SkiHoliday
BasketBall	0.00	0.90	0.84	0.76	1.00
Cricket	0.90	0.00	0.88	0.79	0.82
Graduation	0.84	0.88	0.00	0.68	0.92
Marriage	0.76	0.79	0.68	0.00	0.80
SkiHoliday	1.00	0.82	0.92	0.80	0.00

Robustness: Accuracy classification



Other results: The convergence of GST-SIB and the effect of different metrics.





Conclusion

GST-SIB could become a signature image of an event by which the semantic gap could be bridged reasonably. The thorough experimental results show that the proposed method did meet two essential criteria in classification: discriminability and robustness.

The proposed method has just reached the first step of the personal photo album analyzing problem, there are a lot of unsolved problems need to be investigated. In the future, by integrating user generated contents and enriching gist and saliency models, the authors believe that more complex tasks of personal photo album analyzing problem could be solved rationally.