Augmented Reality & Video Service Emerging Technologies

AR Technology

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AR Feature Detection & Description Technology

AR Feature Detection & Description Technology

❖ AR Feature Detection

- Characteristic primitives of an image are identified
- Identification is done by highlighting unique visual cues
- Various feature detection techniques exist
- Objective is to conduct efficient and effective extraction of stable visual features

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❖ AR Feature Detector Requirements

- Robust against changing imaging conditions
- Satisfy the application's QoS (Quality of Service) requirements

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❖ **AR Feature detection influencing factors**

- Environment
- Changes in viewpoint
- Image scale
- Resolution
- Lighting
- etc.

AR Smartphone Testing Project

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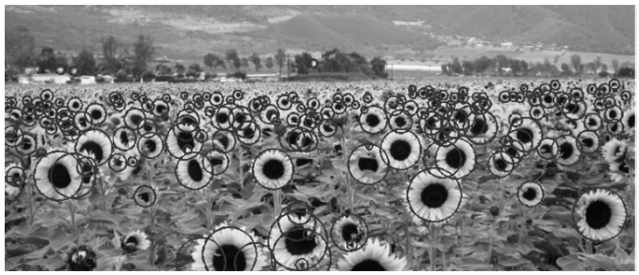
❖ **Interest points detected (in the IPD process) can be used to obtain feature descriptors**

- Circular or square regions centered at the detected interest points
- Size of the regions are determined by the scale



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❖ Feature Detection

- Image features with unique interest points are detected
- Feature descriptors characterize image features using a sampling region
- Sampling based on an image patch around detected interest points

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❖ Feature Detection Methods

- Method-1
- Spectra descriptors are generated by considering the local image region gradients
  - SIFT (Scale-Invariant Feature Transform)
  - SURF (Speeded-Up Robust Features)
  - Gradient is a multi-variable (vector) generalization of the derivative
  - Derivatives are applied on a single variable (scalar) in a function

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❖ Feature Detection Methods

- Method-2
- Local binary features are identified using simple point-pair pixel intensity comparisons
  - BRIEF (Binary Robust Independent Elementary Features)
  - ORB (Oriented FAST and Rotated BRIEF)
  - BRISK (Binary Robust Invariant Scalable Keypoints)

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❖ Feature detection and description schemes

- Schemes that do both feature detection and description
  - SIFT, SURF, ORB, BRISK
- Feature descriptor scheme
  - BRIEF
- Feature detector scheme
  - FAST (Features from Accelerated Segment Test)

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❖ AR Scheme Mix Matching

- Feature detection results in a specific set of pixels at specific scales identified as interest points
- Different feature description schemes can be applied to different interest points to generate feature descriptions
- Application and interest points characteristic based scheme selection is possible

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