Augmented Reality & Video Service Emerging Technologies

SIFT SURF FAST BRIEF ORB BRISK

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SIFT SURF FAST BRIEF ORB BRISK

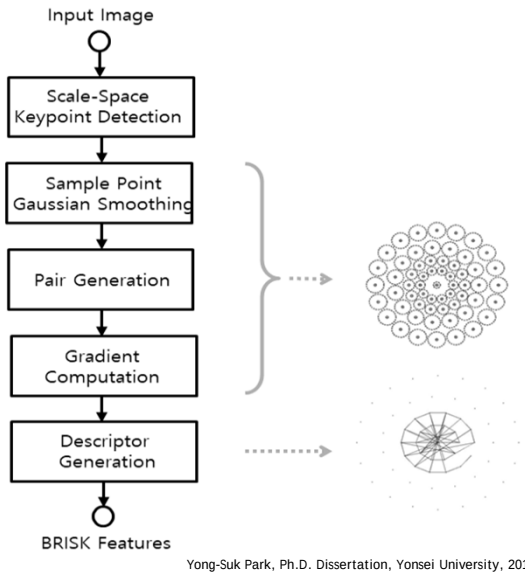
BRISK

BRISK

❖ BRISK: Binary Robust Invariant Scalable Keypoints

- Low computational feature detector scheme
- Known to provide a better performance than SURF with comparable accuracy

BRISK Feature Extraction Process



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❖ Candidate IPD (Interest Point Detection)

- IPD uses an AGAST (Adaptive and Generic corner detection based on the Accelerated Segment Test) corner detector
- AGAST is an extension to FAST
- AGAST uses circular-symmetric pattern region shape with 60 point-pairs
- AGAST uses point-pair line segments arranged in 4 concentric rings

BRISK

❖ Scale-Space Keypoint Detection

- Scale space using Octaves and Intra-Octaves is created
- Each octave is half-sampled from the previous octave
- Intra-octave is down-sampled to be placed in between octaves

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❖ Scale-Space Keypoint Detection

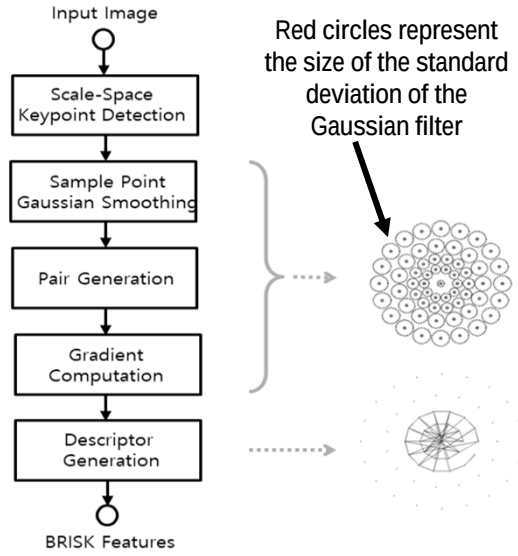
- Non-maximal suppression is conducted on each octave and intra-octave
- Sub-pixel maximum is computed across the patch
- Continuous maximum is computed across scales

BRISK

❖ Sample Point Gaussian smoothing

- Gaussian smoothing is applied to the patch area around each sampling point
  - Red circles represent the size of the standard deviation of the Gaussian filter

BRISK Feature Extraction Process



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❖ Pair Generation

- Point-pairs of pixels are separated into two groups
  - Long segment pairs → Used in coarse resolution
  - Short segment pairs → Used in fine resolution
- Short & Long segment pair separation is used in scale invariance

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❖ Gradient Computation

- Gradient is computed on the long segment pairs first to determine the feature orientation
- Gradient is computed on the short segment pairs to find the amount of rotation in reference to the orientation

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❖ Descriptor Generation

- Binary descriptor is made from the rotated short segment pairs

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