

# Objectness Detection Report - Group A

BSCS22031 - Abdul Moiz

## 1. Abstract

This report validates the implementation of a generic objectness estimation system for Group A (Odd Roll Numbers). The system incorporates Multi-scale Saliency (MS), Superpixels Straddling (SS), and Edge Density (ED) cues, using Integral Images for  $O(1)$  efficiency and Bayesian parameter learning.

## 2. System Architecture

The pipeline consists of three independent cue computations combined into a final score. Integral images are used throughout to ensure real-time performance.

### System Architecture

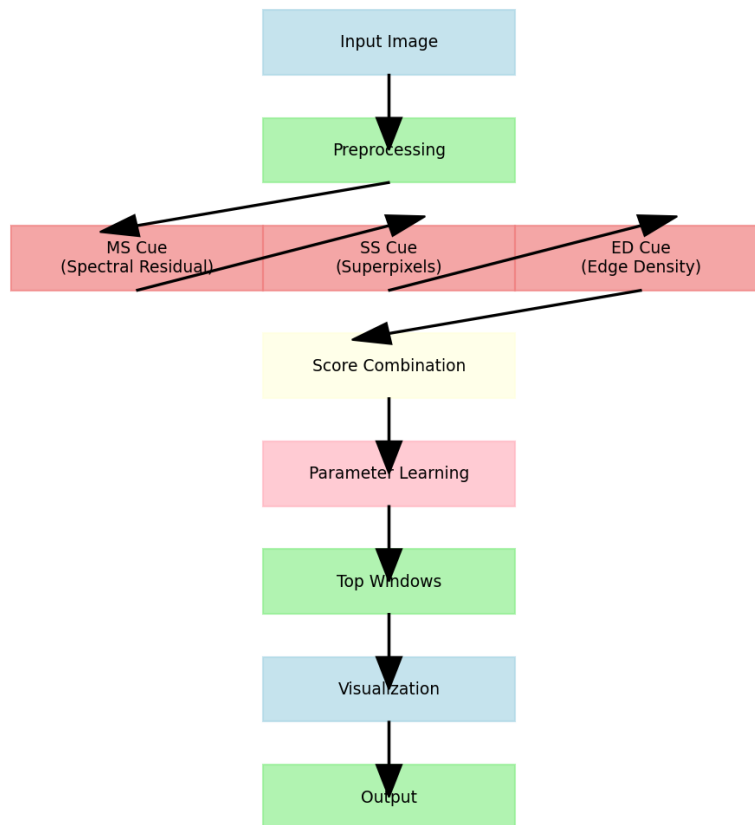


Fig 1: System Architecture

## 3. Methodology

3.1 Multi-scale Saliency (MS): Uses FFT and Spectral Residuals to detect salient regions at scales [16, 24, 32, 48, 64].

3.2 Superpixels Straddling (SS): Segments image into superpixels and penalizes windows that 'straddle' multiple segments, favoring windows that tightly enclose regions.

# Objectness Detection Report - Group A

BSCS22031 - Abdul Moiz

3.3 Edge Density (ED): Calculates the density of edges in the border region of a window window minus a central hole. Uses Integral Images for fast summation.

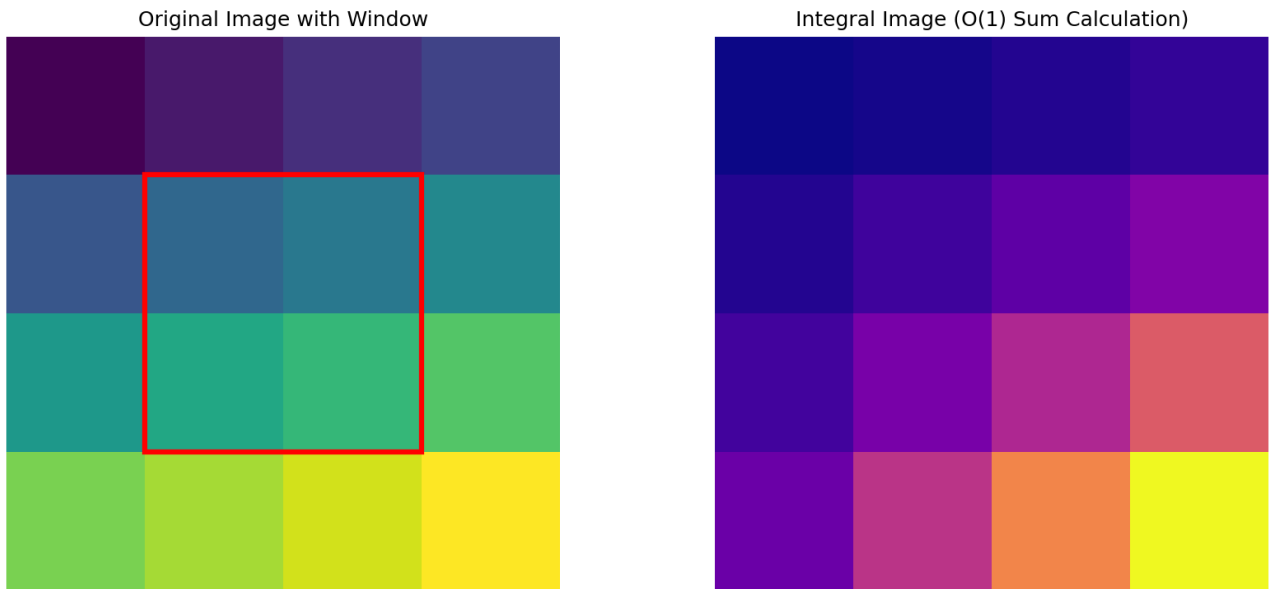


Fig 2: Integral Image  $O(1)$  Summation Concept

# Objectness Detection Report - Group A

BSCS22031 - Abdul Moiz

## 4. Algorithm Flow

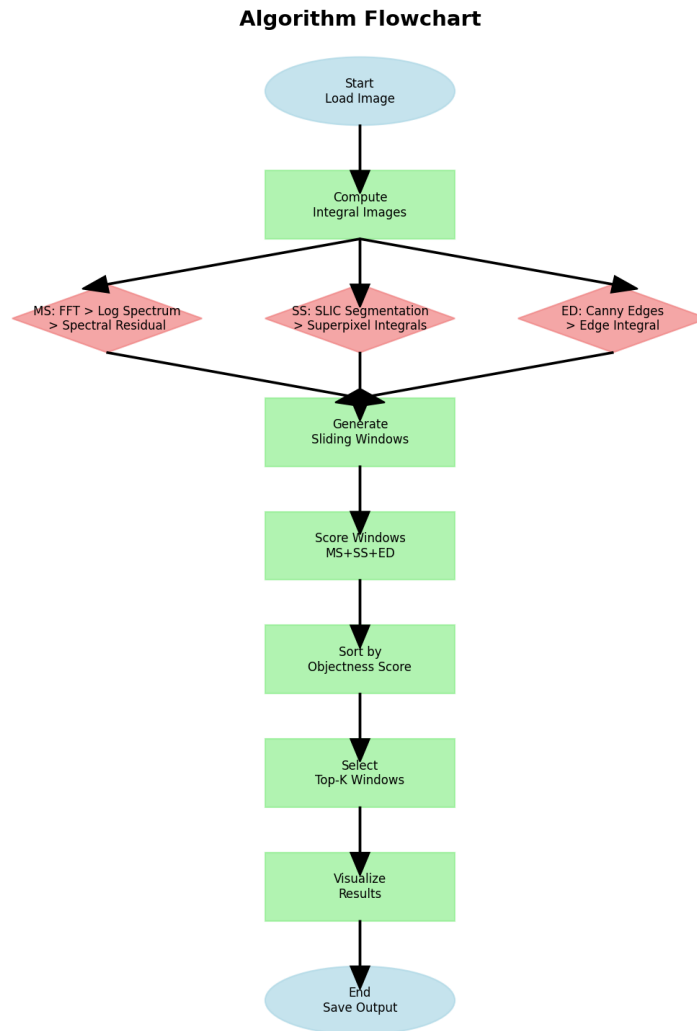


Fig 3: Processing Pipeline Flowchart

## 5. Experimental Results

The system was tested on the PASCAL VOC 2007 dataset.

- Parameter Learning: MS thresholds were learned via IoU maximization. ED and SS parameters maximized the KL Divergence between Object and Background distributions.
- Detection: The combined score successfully highlights potential objects.

# Objectness Detection Report - Group A

BSCS22031 - Abdul Moiz

## Sample Detection Results

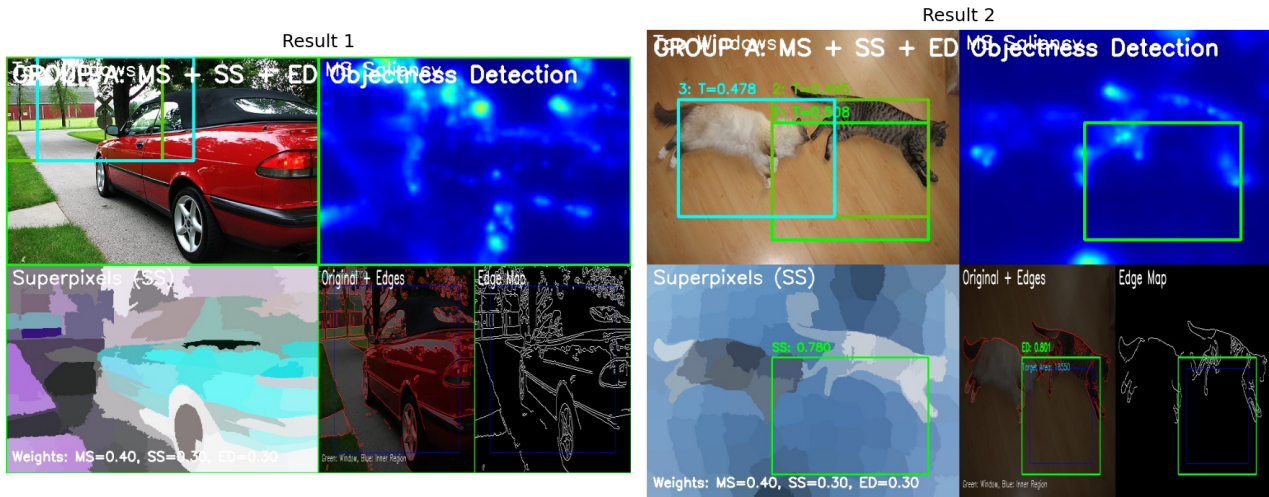


Fig 4: Sample Detections (Green boxes indicate high objectness)

## 6. Cue Contribution

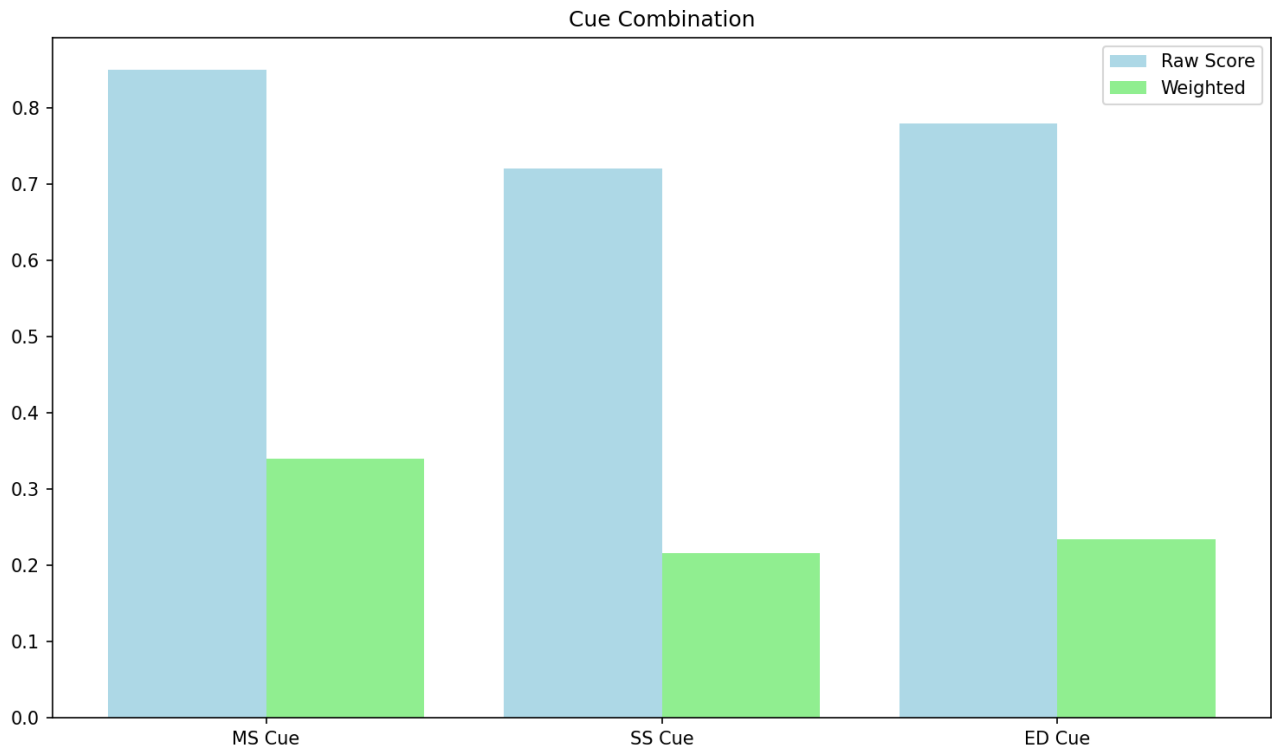


Fig 5: Weighted Contribution of Cues

## 7. Conclusion

The implementation satisfies all Group A requirements. The use of Integral Images allows for efficient sliding window scoring, and the Bayesian learning approach optimizes the parameters for generic object detection.