Method to Identify and Score Darts Thrown into a Dartboard

Jacob Delaney
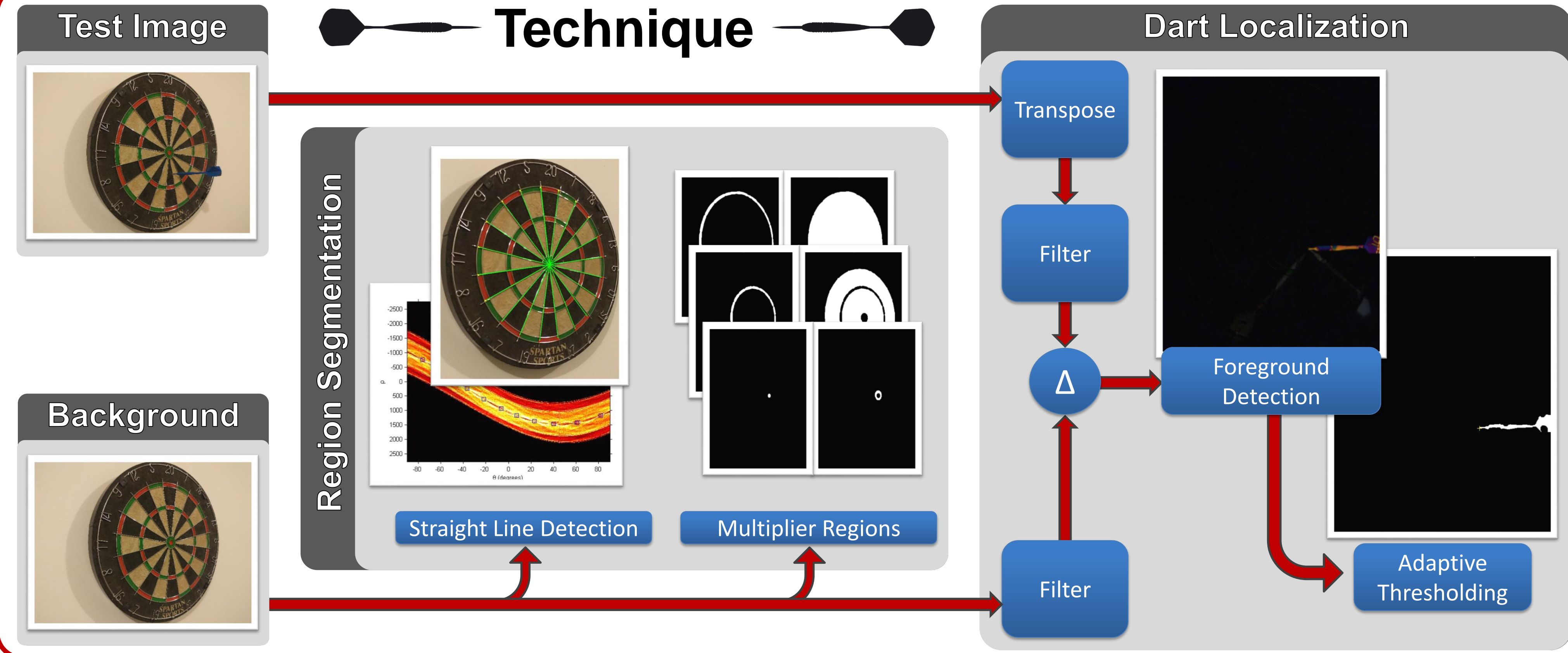Department of Electrical Engineering, Stanford University

Motivation

"Darts" is a general term for a number targeting games that are a popular pastime throughout Europe and North America; all utilizing the standard dart projectiles with a regulation dart board. Each game variant may have different objectives but identifying the region that the dart has hit in the dartboard is always necessary for proper scoring.

This project proposes the use of image processing to identify thrown darts and to detect which scoring region of the dartboard that each dart has struck.
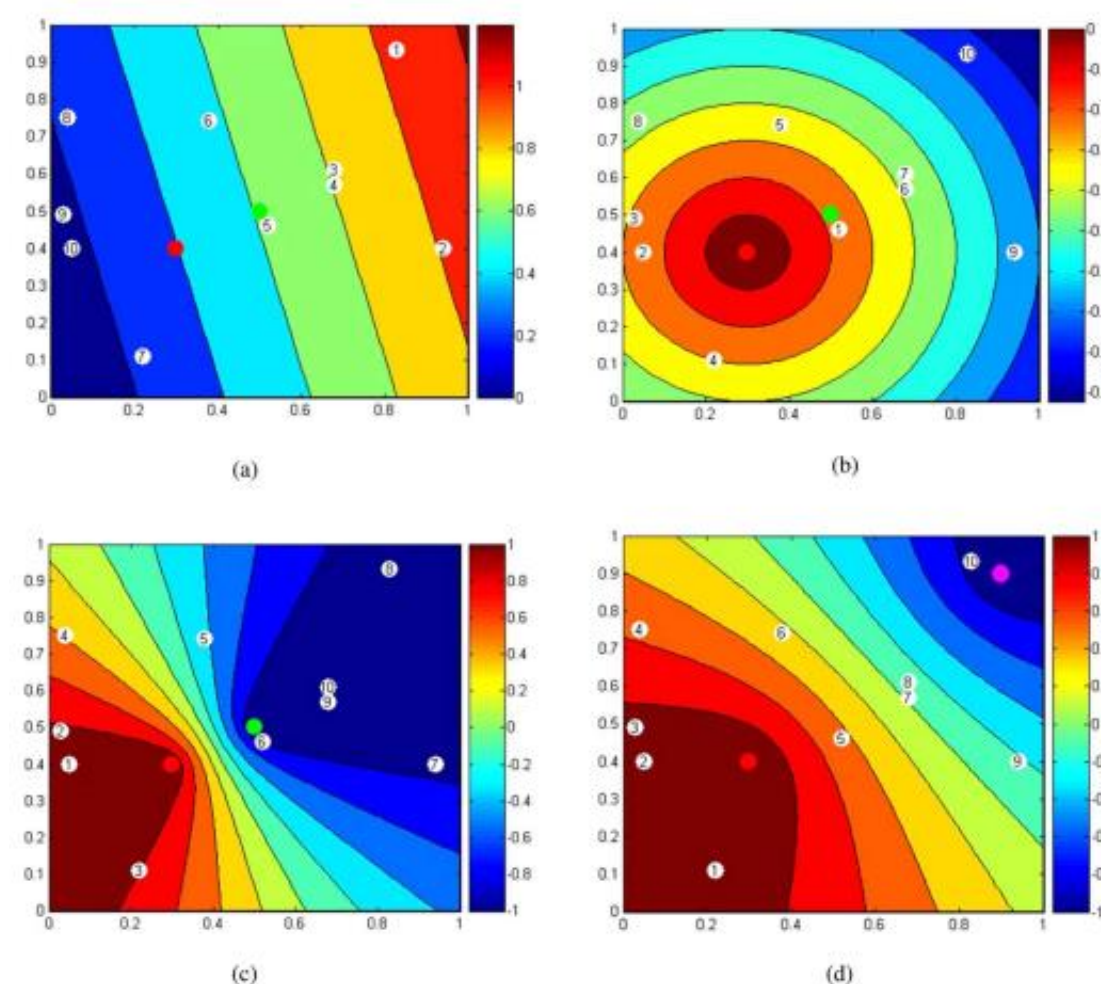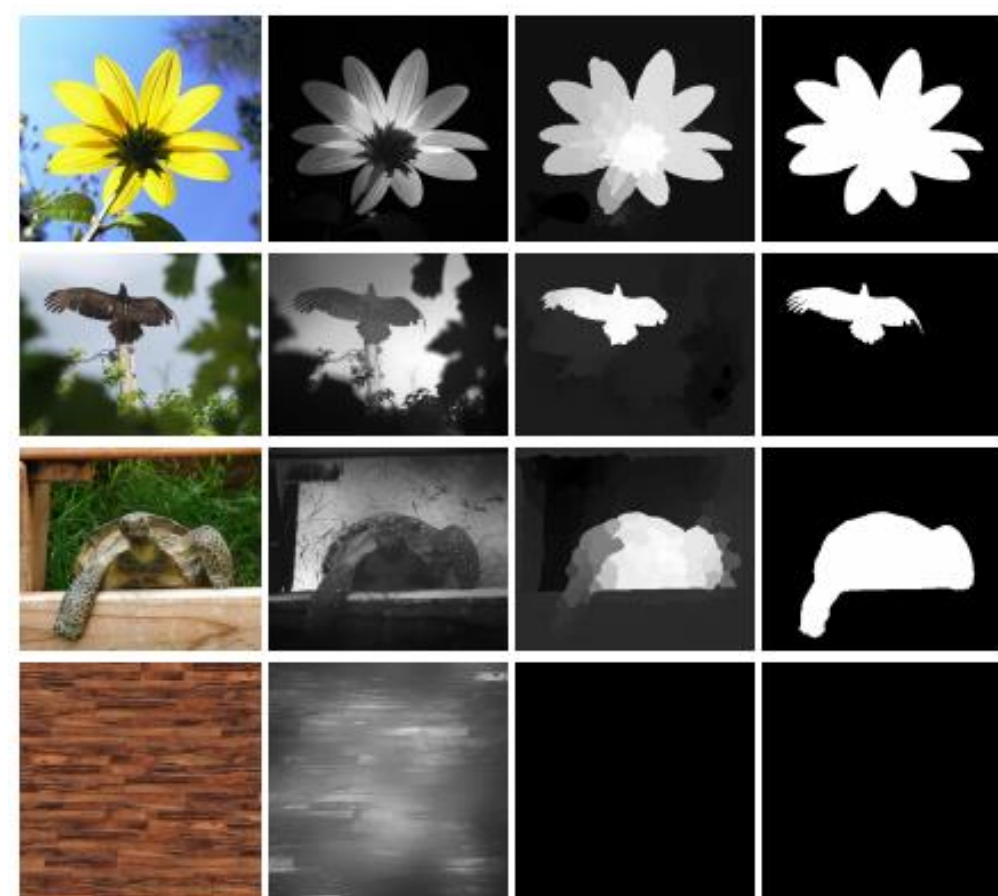
Technique

Test Image

Background

Region Segmentation

Straight Line Detection Multiplier Regions

Dart Localization

Transpose

Filter

Δ

Filter

Foreground Detection

Adaptive Thresholding

Related Work

"Supervised ordering in: Application to morphological processing of hyperspectral images."
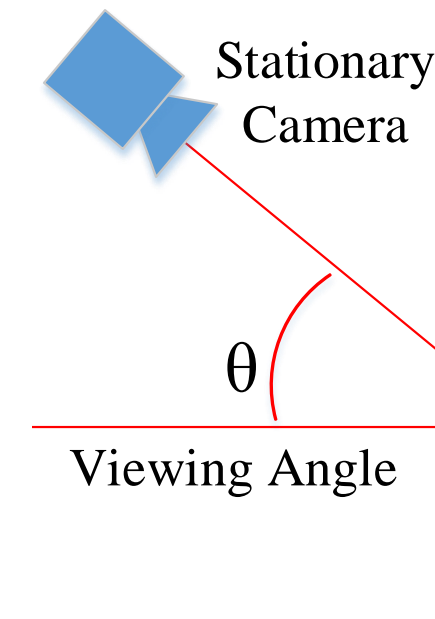Velasco-Forero, Santiago, and Jesus Angulo.
Image Processing, IEEE Transactions on 20.11 (2011): 3301-3308.

(a)   (b)
(c)   (d)

Efficient Salient Foreground Detection for Images and Video using Fiedler Vectors
Federico Perazzi, Olga Sorkine-Hornung, Alexander Sorkine-Hornung
Eurographics Workshop on Intelligent Cinematography and Editing, May 2015, Zurich, Switzerland.

Experimental Results

Stationary Camera

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Viewing Angle

Dart Board

— Tests data gathered from multiple viewing angles and two darts

— The Region Segmentation algorithm is able to create an accurate point map for all pixels within the background image

— Stationary camera and color coded darts utilized for improved foreground detection and Dart Localization

Player 1: 17 Points   Player 2: 8 Points

Sample Output