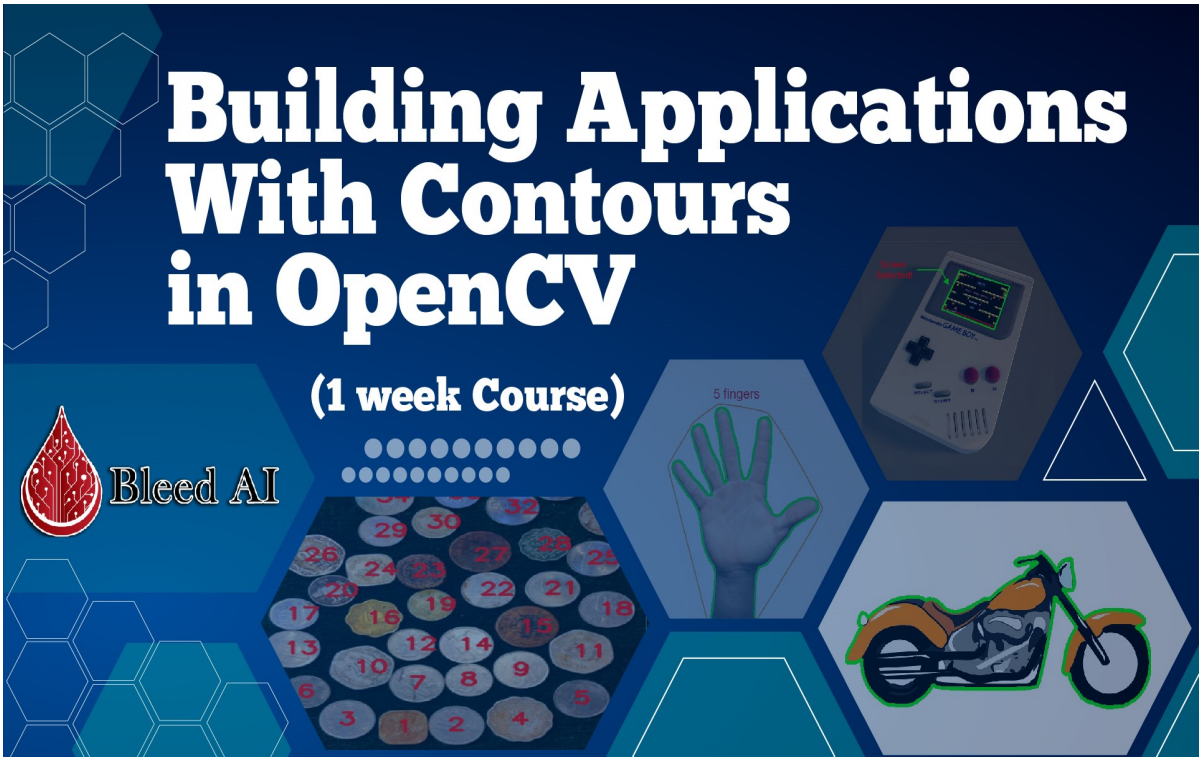
Building Applications With Contours in OpenCV

(1 Week Mini-Course)



Module 1: Introduction

- Welcome to the Course
- Course Structure
- About OpenCV
- Installation
- OpenCV Crash Course
- Learning Resources
- **Quiz 1**

Module 2: Getting Started with Contours & Basic Applications

- 2.1 Contour Detection 101 Part 1: The Basics
    - 2.1.1 Detecting Contours in an Image
    - 2.1.2 Drawing the Detected Contours
    - 2.1.3 Pre-processing images For Contour Detection
        - Thresholding based Preprocessing pipeline
        - Edge Based Preprocessing pipeline
    - 2.1.4 Drawing a selected Contour
    - 2.1.5 Contour Retrieval Modes

- 2.2 Contour Detection 101 Part 2: Contour Manipulation
    - 2.2.1 Extracting the Largest Contour in the image

    - 2.2.2 Sorting Contours in terms of size
    - 2.2.3 Drawing a bounding box around the contour
    - 2.2.4 Drawing Convex Hull

- 2.3 Contour Detection 101 Part 3: Contour Analysis
    - 2.3.1 Image Moments
    - 2.3.2 Finding the centroid of a contour
    - 2.3.3 Finding Contour Area
    - 2.3.4 Contour Properties
        - Aspect ratio
        - Extent
        - Equivalent Diameter
        - Orientation
    - 2.3.5 Working With Hu moments

- 2.4 **Application 1**: Count Connected Objects using Distance Transform and Contours
- 2.5 **Application 2:** Vehicle Detection with Background Subtraction & Contours
- 2.6 Sorting Objects using their Location
-  **Quiz 2**
-  **Coding Challenge 1**
-  **Coding Challenge 2**

Module 3: Contours Advanced Topics

- 3.1 Contour hierarchies & Approximation Methods
    - 3.1.1 Exploring Contour Hierarchy in Detail
    - 3.1.2 Contour Approximation Methods

- 3.2 Contours, Further Manipulation
    - 3.2.1 Drawing Minimum Enclosing Circle
    - 3.2.2 Fitting an Ellipse
    - 3.2.3 Finding Convexity Defects

- 3.3 Contours, Further Analysis
    - 3.3.1 Arc Length of a Contour
    - 3.3.2 Contour Approximation
    - 3.3.3 Finding Angle of Rotation by Fitting a Line
    - 3.3.4 Extreme Points of a Contour
    - 3.3.5 Point Polygon Test

- 3.4 Detect Enclosed Screens in Objects.
- 3.5 **Application 3:** Finding Distance from Camera to Object Using Contours
- 3.6 **Application 4:** Shape detection using 2 different methods.
- 3.7 **(Bonus):** Live Shape Detection on GUI.
-  **Quiz 3**
-  **Coding Challenge 3**

Module 4: Application Case Studies

- 4.1 Building a Real-Time Virtual Pen
- 4.2 Building a Real-Time hand finger counter
- 4.3 Building a Real-Time Money Change Counter