Digit(al) Calculator: Gesture based calculation

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Abstract: Modern technological world is driven by more and more automated processes. Gesture based system can provide much better experience than a touch based system. One such operation is mathematical operations. This project aims at implementing a simple calculator based on hand gesture recognition. And we can input the numbers and symbols just like a normal calculator to perform basic operations to solve our problem.

Implementation Strategy

Input Hand gesture

Skin Detection

Number-Symbol Differentiation

Symbol Identification from + - / X

Number Identification from 0-9

Is input Over?

No

Yes

Calculate result

Above images show the gestures for the number 1 and 5 and symbols for multiplication and addition respectively.

Algorithms:

Skin Detection:
- Skin Detection is done using Y Cb Cr thresholding.

Number/Symbol Differentiation:
- Moments of images are calculated and accordingly, number and symbol are differentiated.

Identification:
- Given number or symbol is identified using two different methods.

Calculation:
- Once the series of gestures is input, from the numbers and symbols, final calculation is displayed on the screen.

Features of the system:
- The system is robust and responsive irrespective of skin color, lighting and hand size.
- The system can be further extended to include more complex mathematical calculations.