The Cartoonist: Facial Expression Matching
Anish Patil, Easswar Balasubramaniam, Mythri Thippareddy

Abstract:

The main aim of this project is to effectively recognize the facial expressions and convey the interpreted expressions in an animated format. The input image will be processed and a cartoon depicting the current emotion of the user will be seen on the output screen. The main challenge at the project was to try and realize this goal as close to real time as possible. The project mainly encompasses face detection, facial feature extraction and expression identification. We utilized the methods used in the existing algorithms for each task and devised simpler methods in order for them to collectively work on the DSP board.

Block Diagram:

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Camera

Face Detection  Facial Feature Extraction  Expression Matching  Display

Frame by Frame loop
```

Algorithms Used:

**Face Detection:** Gradient search

**Eye Detection:** Converting the eye region to a new space using a linear combination of $C_b$ and $C_r$ values and then projecting it onto the vertical and horizontal axis

**Lip Detection:** Using certain commonly observed features of the lips in terms of luminance and color, and taking gradients at strategic locations to find the top, bottom, left and right endpoints of the lips

**Expression Matching:** Using the changes observed in the shape and location of facial features, normalizing them w.r.t distance between the eyes which remain fairly constant to represent the difference in expressions.