Development of Efficient Vision Processing Algorithm Using Color Border Recognition

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The purpose of this project was to develop efficient vision processing algorithm. By using a reference line and borders of color the algorithm was simplified, eliminating complex mathematical operations, and thus reduced error rates. The default vision processing of the existing ROBOTIS-OP2 filters HSV (hue saturation value) of all pixels to search a target HSV and then averages coordinates of all the target pixels to locate a target point. The new algorithm filters HSVs of all pixels to search two target HSVs and then detect the borders of two. The order of algorithm is first to identify two colors (red and blue for testing) across all pixels. When the left of the current pixel's color is one color (red for this testing) and the right pixel's color is another color (blue for this testing) the current pixel becomes a border regardless of current pixel's color. However, when the current pixel doesn't have a color, it isn't included in the recognition. When all borders are identified, the shortest distance between a border and the reference line are compared. The value selected to return (output) would be the closest point to the reference line. This resulted in a huge increase in the accuracy in recognition of target points. The efficiency of the algorithm was tested under three conditions: various locations of target, existence of obstacles, and conditions of lights. The results showed that the vision processing with the new algorithm were more accurate than the default in all three conditions.

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