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README - merge_tag.m

Electrical Subsystem

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merge_tag.m ()

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Description:
The function is used to find the *position of centroids* and *number of stars* found in an image. The input consists of regions, tagged in a particular way, and values pertaining to each tag. The function checks if multiple tags correspond to the same star and groups them accordingly. It then proceeds to find the centroids of these stars. The input parameters consider the top left corner pixel of the image as the origin and the code translates and flips the axes such that the centre of the image becomes the origin
Formula:
The centroid of a single tagged region is defined as:

$$\left(\frac{sum\_x_p}{w_p}, \frac{sum\_y_p}{w_p} \right) \forall\ p \in tag,\ final\ tag = \ 0$$

The centroid of a multi tagged region is defined as:

$$\left(\frac{\Sigma_{p \in r_n} sum\_x_p}{\Sigma_{p \in r_n} w_p}, \frac{\Sigma_{p \in r_n} sum\_y_p}{\Sigma_{p \in r_n} w_p} \right) \forall\ r \in region,\ final\ tag \neq 0$$

The formula to translate and flip the axes is defined as:

$$x_{out} = \left(x_{in} - \frac{length}{2} \right)$$

$$y_{out} = -1 * \left(y_{in} - \frac{breadth}{2} \right)$$

Input parameters:
The input arguments to the function must be written here. The format would

1. **arr_sum_x** : (matrix) - Sums of coordinates along x. *Length*
2. **arr_sum_y** : (matrix) - Sums of coordinates along y. *Length*

3. **arr_weights** : (matrix) - Weights of each tagged region. *Unitless*
4. **arr_num_pixels** : (matrix) - Count of number of pixels in each tagged region. *Unitless*
5. **arr_final_tag** : (matrix) - Final tag corresponding to each tag. *Unitless*
6. **num_tags** : (int) - Count of number of tags. *Unitless*
7. **num_final_tags** : (int) - Count of number of final tags. *Unitless*

Output:

1. **arr_star_coordinates** : (matrix) - Centroids of stars in a frame of reference where x+ is rightwards and y+ is upwards centered at the middle of the image.
2. **num_stars** : (int) - Count of number of stars.

References:

1. Azriel Rosenfeld and John L. Pfaltz. Sequential operations in digital picture processing. J. ACM, 13(4):471-494, October 1966