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Student Satellite Project
Indian Institute of Technology, Bombay
Powai, Mumbai - 400076, INDIA

Website: www.aero.iitb.ac.in/satlab

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Electrical Subsystem

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fe_region_growth ()

Code author: Shaun Zacharia
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Reviewed by: Name of the person who has reviewed the code
Description:
This function is called within the fe_region_growth function and keeps track of the following information for a particular star:

- Weighted sum of x coordinates
- Weighted sum of y coordinates
- Sum of the pixel intensities
- Number of pixels the star is made of

Formula & References:
The centroid of a star is defined as:

$$(x_{centroid}, y_{centroid}) = \left(\frac{\sum_{p \in region} I_p x_p}{\sum I_p}, \frac{\sum_{p \in region} I_p y_p}{\sum I_p} \right)$$

where I_p is the intensity of the pixel and (x_p, y_p) are the coordinates of the pixel.
The algorithm takes the seed pixel and recursively calls itself on its neighbouring pixels till it engulfs all pixels that belong to that star. This algorithm is part of the Region Growth Algorithm.[1]
Input parameters:

1. **arr_img** : (matrix) - input image, with pixel location wrt the top left corner as indices ([i, j]); and the reading at the corresponding pixel as the value stored at [i, j].
2. **i_region_growth** : (uint) - the row of the seed pixel.
3. **j_region_growth** : (uint) - the column of the seed pixel.
4. **centroid_data_st** : (table) - contains columns for weighted sum of x and y coordinates, sum of pixel intensities, number of pixels in each star. This is initially blank, and is updated by the fe_get_data function as it progresses.

Output:

1. **arr_img:** (matrix) - It is the input image which has been modified by setting each seed pixel to 0 as it progresses in the algorithm.
2. **centroid_data_st:** (table) - It is the same table as the input which has been updated with star information.

References

[1] Alexander O. Erlank, *Development of CubeStar : a CubeSat-compatible star tracker*, 2013.