# Change Detection

1. Unsigned char ***readPPMImage(int imgsize[],char *filename,int band)

   Type : Outside function
   Input :
   Imgsize[] : array of size 2 passed by reference. The function assigns the number of rows and columns to the two values.
   Filename : file to be read
   Band : number of bands passed in the image

   Output :
   Returns a 3d array containing the color values of the image –
   Bands = 3 : rgb values corresponding to each pixel
   Bands = 1 : only one dimension contains the values, others contain 0s.

2. int **prepareNewLabels(char *seg_result_label_file, int rows, int cols)

   Type : Outside function

   Input :

   seg_result_label_file : the segmentation labels result file provided by the meanshift algorithm

   rows : rows of the image

   cols : cols of the image

   Output :

   Returns new labels of the pixels in the image in a 2d array of size rows x cols

3. void fillRegionNewLabels(int **olinfo, int **nlinfo, int ol, int nl, int sx, int sy, int **mymap, int rows, int cols)

   Type: Outside Function (support function to prepareNewLabels function)
   Input :
   Olinfo : the original labels given by the segmentation algorithm
   Nlinfo : passed by reference to store the new labels
   Ol : old label of pixel (sx,sy)
   Nl : new label of pixel (sx,sy)
   Sx : x coordinate of the pixel
   Sy : y coordinate of the pixel
   Mymap : 2d flag array used in determining the start of a new label
   Rows : rows of the image
   Cols : cols of the image

Output:
Void

4. vector< vector< int > > prepareObjectInfo(int rows, int cols, int **label_1, int **label_2, int **&dmerge, int &NO)

   Type : Outside function

   Input:

   Rows : rows of the image

   Cols : cols of the image

   Label_1 & label_2 : new labels of pan image

   Dmerge : 2d flag array passed by reference utilized in identifying a new object

   NO : number of objects in the image. To be calculated by this function. Passed by reference.

   Output:

   2d vector of size number_of_objects x 6 : containing the following information about each object.

   Object number, area, xmin, xmax, ymin, ymax

5. void fillRegionObjectInfo(int **dt1,int **dt2,int **&dmerge,int val1,int val2,int label,int bi,int bj,vector< int > &meta_obj,int rows, int cols)

   Type: Outside Function (support function to prepareObjectInfo function)

   Input :
   Dt1 & dt 2: the original labels given by the segmentation algorithm
   dmerge : 2d flag array used in determining the start of a new object
   val1 & val2 : object id of the current object
   label : flag variable to check the existence of current object at a particular pixel
   bi : x coordinate of the current pixel
   bj : y coordinate of the current pixel
   meta_obj : passed by reference. To be filled in this function by the information of each object
   Rows : rows of the image
   Cols : cols of the image

   Output:
   Void

6. void createObjects(int NO,vector< vector< int > > objectInfo)

Type : Member function of Image class

Input :
NO : number of objects in the image
objectInfo : 2d vector containing the information regarding all the objects of the image

Output :
Void

Note : This function calculates the attributes of each object and stores it in the objectArray member variable of the Image class.

7. int getNOB()

   Type : Member function of Image class

   Input :
   None

   Output :
   Returns the number of bands in the image

8. unsigned char *getPixelData(int x, int y)

   Type : Member function of Image class

   Input :
   X : x coordinate of the pixel
   Y : y coordinate of the pixel

   Output:
   Returns the color values of the given pixel

9. int getImageRows()

   Type : Member function of Image class

   Input :
   None

   Output:
   Returns the number of rows in the image

10. int getImageCols()

Type : Member function of Image class

Input :
None

Output:
Returns the number of cols in the image

11. void createSegmentedImageInfo(int **merge_map)

    Type : Member function of Image class

    Input :
    Merge_map : a 2d array containing the labels

    Output:
    None

    Note : populates the segmentedImageInfo member variable with object labels

12. void setObjectInfo(Image *I)

    Type : Member function of Object class (support function of createObjects member function of Image class)

    Input :
    I : pointer to the image instance

    Output:
    None

    Note : sets the member pointer parentImage as the passed image I. Also, calculates the member variable mask for the current object.

13. void createAttribute(int id)

    Type : Member function of Object class (support function of createObjects member function of Image class)

    Input :
    Id: label of the current object

    Output:
    None

Note :
Calculates the attributes and populates the fVector member variable of Object class for the current object.

14. vector< vector< float > > changed(int rows, int cols, int **dt1, int**dt2, int info1[], int info2[], int NO1, int NO2)

    Type : Outside Function

    Input :
    Rows : rows of the image
    Cols : cols of the image
    Dt1 : 2d array containing labels of the pixels in the time 1 image
    Dt2 : 2d array containing labels of the pixels in the time 2 image
    Info1 : object info of the time 1 image
    Info2 : object info of the time 2 image
    NO1 : number of objects in time 1 image
    NO2 : number of objects in time 2 image

    Output:
    2d vector containing the information of objects in the merged image

15. void fillRegionChanged(int rows, int cols, int info1[],int info2[], int **dt1, int **dt2, int **&dmerge,int val1,int val2,int label,int bi,int bj,vector<float > &meta_obj)

    Type : Outside Function (support function to Changed Function)

    Input :
    Rows : rows of the image
    Cols : cols of the image
    Info1 : information about the objects in time 1 image
    Info2 : information about the objects in time 2 image
    Dt1 : 2d array containing labels of the pixels in the time 1 image
    Dt2 : 2d array containing labels of the pixels in the time 2 image
    Dmerge : passed by reference. 2d flag array to identify the starting of a new object in the merged image
    Val1 : object label in time 1 image
    Val2 : object label in time 2 image
    Label : new label in merged image
    Bi : x coordinate of current pixel
    Bj : y coordinate of current pixel
    Meta_obj : information about the objects in the merged image

    Output:

Void

16. int *changeReporting(int rows, int cols, float low, float high, vector< vector< float > > pinfo, int **mergemap)

    Type : Outside function

    Input :
    Rows : rows of the image
    Cols : cols of the image
    Low : the value of the parameter low (user input)
    High : the value of the parameter high (user input)
    Pinfo : information about the new objects In the merged image
    Mergemap : 2d flag array utilised in identifying the starting of a new object

    Output :
    An array containing a class label for each object in the merged image