```
::Detector
                 # avgClusterednessDegree
                 # avgDensity
                 # image
                 # outputFilepath
                 # debugMode
                 # outputImage
                 # detectMethodCalled
                 # detectorSpecificFieldsInitialised
                 #OUTPUT CLUSTEREDNESS
                 #OUTPUT_DENSITY
                 # ERR_OUTPUT_WITHOUT
                  DETECT
                 # ERR_OUTPUT_FILE
                 # ERR_INVALID_IMAGE
                 #CSV EXTENSION
                 # IMG_EXTENSION
                 # XML_EXTENSION
                 # WIN_OUTPUT_IMAGE
                 # KEY_ESC
                 # KEY_SAVE
                 #LABEL ATTRIBUTE
                 # LABEL_COMMENT
                 # LABEL_COMMENT_CONTENTS
                 # LABEL_EXPERIMENT_TIMEPOINT
                  NUMERIC_STATE_VARIABLE
                 # LABEL EXPERIMENT TIMEPOINT
                  SPATIAL ENTITY
                 # LABEL_EXPERIMENT_TIMEPOINT
                  NUMERIC STATE VARIABLE NAME
                 # LABEL_EXPERIMENT_TIMEPOINT
                 _NUMERIC_STATE_VARIABLE_VALUE
                 # LABEL_SPATIAL_ENTITY
                  PSEUDO 3D
                 # LABEL_SPATIAL_ENTITY_TYPE
                 # LABEL_SPATIAL_ENTITY
                  CLUSTEREDNESS
                 # LABEL_SPATIAL_ENTITY
                  DENSITY
                 #LABEL SPATIAL ENTITY AREA
                 # LABEL_SPATIAL_ENTITY
                  PERIMETER
                 # LABEL_SPATIAL ENTITY
                  _DISTANCE_FROM_ORIGIN
                 # LABEL_SPATIAL_ENTITY
                  ANGLE
                 # LABEL_SPATIAL_ENTITY
                  SHAPE
                 # LABEL SPATIAL ENTITY
                  TRIANGLE_MEASURE
                 # LABEL_SPATIAL_ENTITY
                  RECTANGLE MEASURE
                 # LABEL_SPATIAL_ENTITY
                  _CIRCLE_MEASURE
                 # LABEL_SPATIAL_ENTITY
                  CENTROID_X
                 #LABEL SPATIAL ENTITY
                  CENTROID Y
                 # LABEL_AVG_CLUSTEREDNESS
                 # LABEL_AVG_DENSITY
                 + Detector()
                 + ~Detector()
                  + detect()
                 + outputResults()
                 # initialise()
                 # initialiseDetectorSpecific
                 FieldsIfNotSet()
                 # setDetectorSpecificFields
                 InitialisationFlag()
                 # initialiseDetectorSpecific
                 Fields()
                 # initialiseImageDependent
                 Fields()
                 # initialiseDetectorSpecific
                 ImageDependentFields()
                 # initialiseImageOrigin()
                 # is ValidInputImage()
                 # getDetectorTypeAsString()
                 # detect()
                 # detectInDebugMode()
                 # detectInReleaseMode()
                 # polygonAngle()
                 # polygonAngle()
                 # minAreaRectCentre()
                 # findGoodPointsForAngle()
                 # findGoodIntersectionPoints()
                 # displayResultsInWindow()
                 # outputResultsToFile()
                 # outputResultsToImage()
                 # storeOutputImageOnDisk()
                 # outputResultsToCsvFile()
                 # outputResultsToCsvFile()
                 # outputSpatialEntitiesToCsvFile()
                 # outputAveragedMeasuresTo
                 CsvFile()
                 # outputResultsToXMLFile()
                 # outputResultsToXMLFile()
                 # addSpatialEntitiesToPropertyTree()
                 # addAverageMeasuresToPropertyTree()
                 # addNumericStateVariableTo
                 PropertyTree()
                 # constructPropertyTree()
                 # addSpatialEntityProperties
                 ToTree()
                 # addSpatialEntityTypeToPropertyTree()
                 # getCollectionOfSpatialEntity
                 Pseudo3D()
                 # processImageAndDetect()
                 # clearPreviousDetectionResults()
                 # createTrackbars()
                 # createTrackbarsWindow()
                 # createDetectorSpecificTrackbars()
                 # processPressedKeyRequest()
                 # displayImage()
                 # printOutputErrorMessage()
                                             Д
                                       multiscale::analysis
                                                ::RegionDetector
                                       - alpha

    beta

                                       - blurKernelSize
                                       - morphologicalCloseIterations

    regionAreaThresh

                                       - thresholdValue
                                       - regions
                                       DETECTOR_TYPE
                                       - TRACKBAR_ALPHA
                                       - TRACKBAR BETA
                                       - TRACKBAR KERNEL
                                       - TRACKBAR_MORPH
                                        TRACKBAR_CANNY
                                       - TRACKBAR_EPSILON
                                       - TRACKBAR_REGION_AREA
                                        THRESH
                                       - TRACKBAR THRESHOLD
                                       - HIERARCHY_NEXT_INDEX
                                       - HIERARCHY_PREV_INDEX
                                       - HIERARCHY_FIRST_CHILD
                                       _INDEX
                                       HIERARCHY_PARENT_INDEX
                                       - USE CANNY L2
                                       - CONTOUR_AREA_ORIENTED
                                       ALPHA_REAL_MIN
multiscale::analysis
                                       - ALPHA REAL MAX
        ::ClusterDetector
                                       - BETA_REAL_MIN
# entityPileupDegree
                                       - BETA REAL MAX
# eps
                                       - ALPHA MAX
# minPoints
                                       - BETA_MAX
                                       - KERNEL MAX
# clusters
                                       - MORPH ITER MAX
- DETECTOR_TYPE
                                       - CANNY_THRESH_MAX
TRACKBAR_EPS
- TRACKBAR_MINPOINTS
                                       - EPSILON MAX
                                       - REGION AREA THRESH MAX
- MIN POINTS MIN
- MIN_POINTS_MAX
                                       - THRESHOLD_MAX
- EPS MIN
                                        THRESHOLD_CLUSTEREDNESS
- EPS MAX
                                       - INTENSITY_MAX
- EPS_REAL_MIN
                                       - THRESHOLD_HOLE_AREA
- EPS REAL MAX
                                       - POLYGON CLOSED
                                       - DISPLAY LINE THICKNESS
+ ClusterDetector()
+ ~ClusterDetector()
                                       + RegionDetector()
                                       + ~RegionDetector()
+ getEps()
+ getMinPoints()
                                       + getAlpha()
                                       + getBeta()
+ getClusters()
+ setEps()
                                       + getBlurKernelSize()
+ setMinPoints()
                                       + getEpsilon()
# initialiseDetectorSpecific
                                       + getMorphologicalCloseIterations()
                                       + getOriginXCoordinate()
Fields()
# createDetectorSpecificTrackbars()
                                       + getOriginYCoordinate()
# clearPreviousDetectionResults()
                                       + getRegionAreaThresh()
                                       + getThresholdValue()
# getDetectorTypeAsString()
# processImageAndDetect()
                                       + getRegions()
# detectEntitiesInImage()
                                       + setAlpha()
# detectAndAnalyseClusters()
                                       + setBeta()
# detectClusters()
                                       + setBlurKernelSize()
# convertEntities()
                                       + setEpsilon()
# convertNonPiledUpEntities()
                                       + setMorphologicalCloseIterations()
# convertPiledUpEntities()
                                       + setOriginXCoordinate()
# addEntitiesToClusters()
                                       + setOriginYCoordinate()
# analyseClusters()
                                       + setRegionAreaThresh()
# analyseClustersOriginDependent
                                       + setThresholdValue()
Values()

    initialiseDetectorSpecific

# updateClusterOriginDependent
                                       Fields()
Values()

    initialiseDetectorSpecific

# getClusterConvexHull()
                                       ImageDependentFields()
# computeClusterednessIndex()
                                       - createDetectorSpecificTrackbars()
# computeAveragePileUpDegree()
                                       getDetectorTypeAsString()
# getCollectionOfSpatialEntity
                                       processImageAndDetect()
Pseudo3D()
                                       - changeContrastAndBrightness()
# convertEpsValue()
                                       smoothImage()
# getValidMinPointsValue()
                                       - morphologicalClose()
                                       - thresholdImage()
                                       findRegions()
                                       - computeAverageMeasures()
                                       - computeAverageClusteredness
                                       - sumOfAverageCentroidDistances()

    computeAverageDensity()

                                       findPolygonsInImage()
                                       createPolygons()
                                       - createPolygon()
                                       setPolygonOuterContour()
                                       - setPolygonInnerContours()

    approximatePolygonOuterBorder()

                                       - createRegionFromPolygon()
                                       - isValidContour()
                                       - isValidHole()
                                       regionDensity()
                                       - clearPreviousDetectionResults()
                                       - getCollectionOfSpatialEntity
                                       Pseudo3D()
                                       - outputResultsToImage()
                                       - outputRegionToImage()

    outputRegionOuterBorderTo

                                       Image()
                                       - outputRegionInnerBorders
                                       Tolmage()
                                       - convertAlpha()
                                       convertBeta()
multiscale::analysis
    ::SimulationClusterDetector

    thresholdedImage

- height
- width
- entityHeight
- entityWidth
```

- THRESHOLD
- THRESHOLD_MAX
- ENTITY_THRESH
- DATAPOINT_WIDTH
- DATAPOINT_THICKNESS
+ SimulationClusterDetector()
+ ~SimulationClusterDetector()
- initialiseDetectorSpecific
ImageDependentFields()
- initialiseThresholdedImage()
- detectEntitiesInImage()
- detectEntitiesInImage()
- isEntityAtPosition()
- getEntityCentrePoint()
- getEntityContourPoints()

- computePileUpDegreeAtPosition()

- outputClusterTriangularShape()- outputClusterRectangular

- outputClusterCircularShape()

- outputResultsToImage()- outputClusterToImage()- outputClusterShape()

Shape()

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