

This code identifies and extracts angles from a image for analysis. For conciseness, the individual results showing each angle value won't be shown.



```
In[=]:= image = ;

p1 = Binarize[ImagePad[image, ImageDimensions[image][[1]] * 0.05]];
p2 = Thinning[DeleteSmallComponents[ColorNegate[DeleteSmallComponents[p1, 300]], 300]];
p2 = Pruning[p2];
p2 = Thinning[p2];
img = p2;
g = MorphologicalGraph[img, PlotRangePadding -> 2]

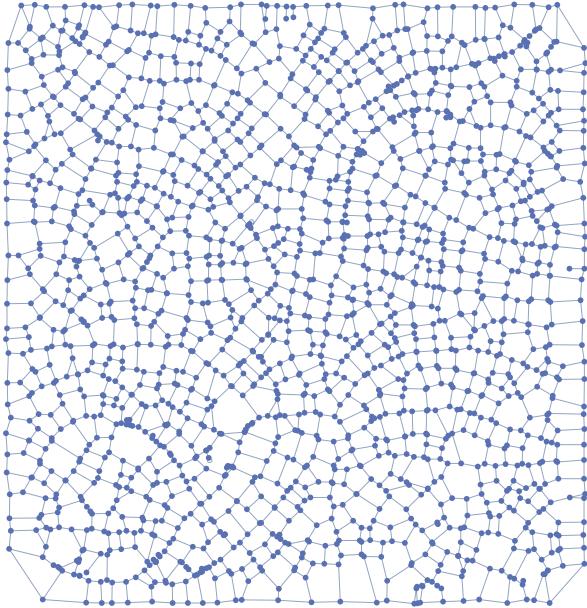
vcoords = AssociationThread[VertexList[g], GraphEmbedding[g]];
bottomthreshold = 30.;
vlists = Select[Length@# > 1 &] @
  Gather[VertexList[g], Norm[vcoords[#] - vcoords[#2]] < bottomthreshold &];
g2 = SetProperty[Fold[VertexContract, g, vlists],
  {VertexLabels -> "Name", ImageSize -> Large, VertexCoordinates -> {v_ :> vcoords[v]} }];
IndexGraph[g2]

EdgeCount[%]
VertexCount[%%]
VertexDegree[%%%]

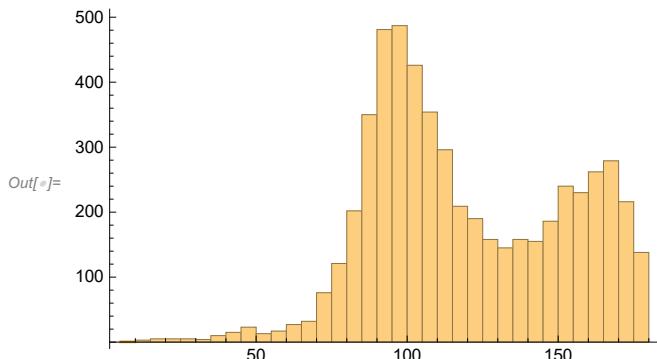
centerVertexQ[edgeList_, vertex_] :=
  If[Length[Position[edgeList, vertex]] != 1, True, False]
getCenterVertex[graph_] :=
  Module[{edgeList = EdgeList[graph], vertexList = VertexList[graph]},
    Pick[vertexList, centerVertexQ[edgeList, #1] & /@ vertexList]
  ]
centerVertexList = getCenterVertex[g];
vertexPos = PropertyValue[{g, #}, VertexCoordinates] & /@ Sort[VertexList[g]];
createVector[relatedVertex_List, centerVertex_] :=
  {
    vertexPos[[relatedVertex[[1]]]] - vertexPos[[centerVertex]],
    vertexPos[[relatedVertex[[2]]]] - vertexPos[[centerVertex]]
  }
calcAngleOfCenterVertex[vertexNr_] :=
  Module[{othersideVertex, relatedPairedVertex},
    othersideVertex =
      Cases[EdgeList[g], UndirectedEdge[x_, vertexNr] | UndirectedEdge[vertexNr, x_] :> x];
    relatedPairedVertex = Subsets[othersideVertex, {2}];
    radList =
      Apply[
        VectorAngle,
        createVector[#1, vertexNr] & /@ relatedPairedVertex,
```

```
{1}  
];  
  

$$\frac{180 \#1}{\pi} \& /@ \text{radList}$$
  
]  
calcAngleOfCenterVertex /@ centerVertexList  
DeleteCases[%, {Indeterminate}];  
Dimensions[%]  
Flatten[%];  
fd1 = Select[%, 0 < # < 180 &];  
Histogram[%, 36]  
Print["Mean: ", Mean[%]]  
Print["Median: ", Median[%]]  
Print["Standard Deviation: ", StandardDeviation[%]]
```



Out[\circ]=



Mean: 119.534

Median: 111.753

Standard Deviation: 32.1282