**IVEN2.0 Output description**August 2023  
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Here we include a brief description of the outputs from IVEN2.

**IVEN2out\_.....csv**

All data from the original output file will be output with original headings.

After this we include 7 columns

* ‘outside\_bool’ : this column indicates whether a cell has been identified as outside (val==1) or inside (val==0). This classification comes from the automatic classification using the convex hull and subsequent manual corrections using the IVEN2 user interface.
* ‘num\_nbrs’ : number of neighbours identified using the Delaunay triangulation and subsequent thresholding (using the user defined thresholding method)
* ‘num\_nbrs\_outside’ : number of neighbours that were classified as outside
* ‘num\_nbrs\_inside’ : number of neighbours that were classified as inside
* ‘nbr\_ids’ : ID numbers (from the original input file) of cells that were identified as neighbours
* ‘nbr\_dist\_mean’ : the mean of the distances between each cell and its neighbours.
* ‘nbr\_dist\_range’ : the range (max-min) of the cell to neighbour distances, if this value is smaller then it represents a neighbourhood where all neighbours are fairly equidistant from each other.

The final two entries try to offer a small insight into the architecture of the individual cell neighbourhoods. For more extensive analyses of cell to neighbour distances, we encourage users to refer to the IVEN2dists file.

**IVEN2dists\_....csv**

This output file includes a list of **all** cell to neighbour distances within the sample being analysed.

The data is output as the following –

* ‘cell\_id1’ : ID of cell1 in the distance calculation
* ‘cell\_id2’ : ID of cell2 in the distance calculation, cell2 is a neighbour of cell1. (only neighbour distances are included in this summary)
* ‘outside\_bool1’ : whether cell1 is inside (val==0) or outside (val==1) as classified by IVEN2
* ‘outside\_bool2’ : whether cell2 is inside (val==0) or outside (val==1) as classified by IVEN2
* ‘nbr\_dist’ : distance between cell1 and cell2

**IMPORTANT: each cell to neighbour distance is included only once within this summary. So if cell\_id1 = 2 and cell\_id2 = 4 , then the distance will be included within the data. However, if cell\_id1=4 and cell\_id2=2, the distance will NOT be included within the data, as it has already been included. This is to avoid errors during statistical analyses. Therefore, if you are looking at the distances between neighbours for a specific cell, find the distances where either cell\_id1 or cell\_id2 equal the cell ID you are interested in.**