Problem Set I

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Visualization of dendritic morphology

Attached you will find morphology data txt files (.swc) of one pyramidal dendrite and one Purkinjie dendrite. Use MATLAB to write a simple program:

- Load the data file.
- Plot and visualize the neuronal 3D arbor shape.
- Calculate how many branching points on both the pyramidal and Purkinjie dendrite.
- Perform a Sholl plot. Center on the cell body and draw spheres, and plot the number of intersections between sphere and dendrites as a function of sphere radius.

In the swc file, each column has the following meaning (from left to right): segment index, segment type (cell body =1,, dendrite = 3), x coordinate (μm), y coordinate (μm), z coordinate (μm), segment diameter (μm), father segment index (root index = -1).