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DEPARTMENT OF COMPUTER SCIENCE
CS 524

Summary of "The Connectome Visualisation Utility"

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1 SUMMARY

The Connectome Visualisation Utility is one of the many tool available in the literature to visualize the human brain connection. This kind of tool are very useful to understand the connectivity data experts collect.
To visualise the Connectome the authors propose three different kinds of visualisation: 3D brain view, circle view and matrix view.
In **3D Brain View** the brain surface is depicted on the screen and nodes are located according to the physical position in the brain itself. The many connections present in the brain are represented as edges in the brain. This view is interactive and it is possible to isolate all the connections that starts from a selected node. Figure 1 shows this view.
With **Circle view** all the regions are displayed along a circle. The connection between all the nodes are represented as edges that go from region to another inside the circle. There are two ways of organising the position of the regions. In fact, it is possible to order them according to their names (alphabetically) or according to the real position in the brain as it is shown in figure 2.
The **Matrix view** represents the entire network using the adjacency matrix. Nodes are positioned along the sides of a square matrix. Using colors each cell represent how strong the connection between two nodes is. Still in this view, it is possible to order the nodes alphabetically by their names or by the anatomy. Figure 3 shows this kind of view.

In the last two views the order in which the regions are displayed has a relatively big influence on the visualization itself.

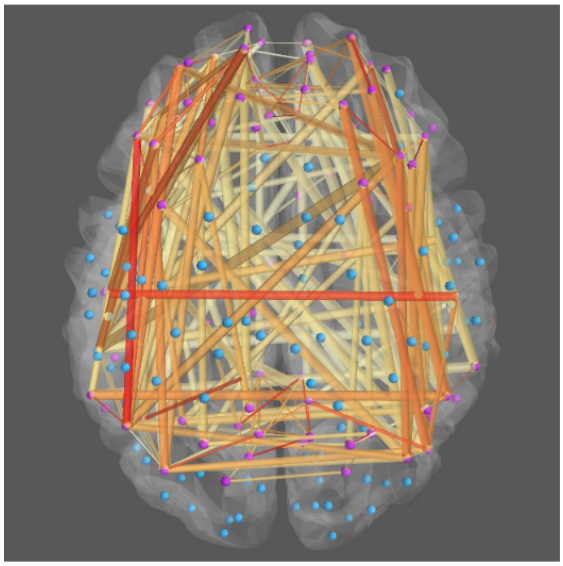

Figure 1: 3D Brain View.

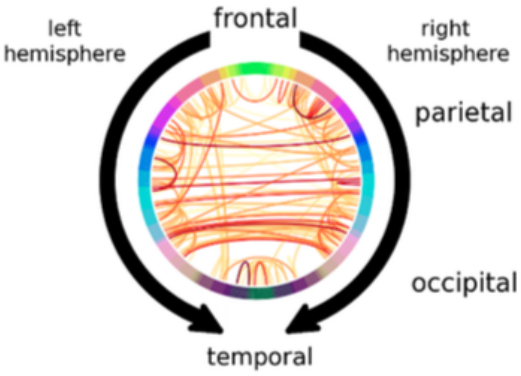

Figure 2: Circle View.

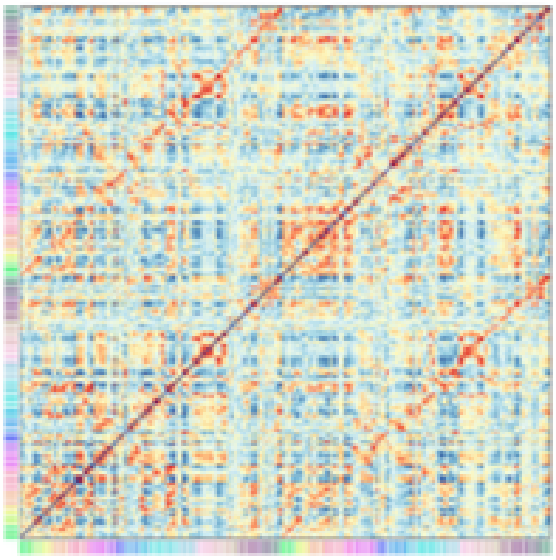

Figure 3: Matrix View.

An interesting characteristic of these tool is the chance to bind the size of the spheres, which represent the brain regions, to some graph metric such as nodal strength, nodal efficiency. This is a very interesting functionality since experts could understand in a very straightforward way some nodal measure computed on the overall network.
From this paper it is not clear how it is possible to interact with images. In particular, using the 3D Brain view it is not clear if it is possible to navigate and explore the brain in detail. Since all the images reported in the paper are taken from the same perspective, this makes me thing that the interaction with model is quite limited. In the paper it only mentioned that is possible to export small video "which capture user-defined interactive came movements". In my opinion, the interaction with the model should be as easy as possible, since experts want to freely explore the brain connections.