

Comparative Connectomics: Mapping the Inter-Individual Variability of Connections within the Regions of the Human Brain

Csaba Kerepesi, Balázs Szalkai, Bálint Varga, Vince Grolmusz

PIT Bioinformatics Group, Eötvös University, H-1117 Budapest, Hungary

Uratim Ltd., H-1118 Budapest, Hungary

kerepesi@pitgroup.org, szalkai@pitgroup.org, balorkany@pitgroup.org,
grolmusz@pitgroup.org

The human brain graph, or connectome is a description of the connections of the brain: the nodes of the graph correspond to small areas of the gray matter, and two nodes are connected by an edge if a diffusion MRI-based workflow finds fibers between those brain areas. We have constructed 1015-vertex graphs from the diffusion MRI brain images of 395 human subjects and compared the individual graphs with respect to several different areas of the brain. The inter-individual variability of the graphs within different brain regions was discovered and described. We have found that the frontal and the limbic lobes are more conservative, while the edges in the temporal and occipital lobes are more diverse. Interestingly, a “hybrid” conservative and diverse distribution was found in the paracentral lobule and the fusiform gyrus. Smaller cortical areas were also evaluated: precentral gyri were found to be more conservative, and the postcentral and the superior temporal gyri to be very diverse.

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