

Understanding the amazingly complex human [cerebral cortex](#) requires a map (or parcellation) of its major subdivisions, known as [cortical areas](#). Making an accurate areal map has been a century-old objective in neuroscience. Using multi-modal magnetic resonance images from the Human Connectome Project (HCP) and an objective semi-automated neuroanatomical approach, we delineated 180 areas per hemisphere bounded by sharp changes in cortical architecture, function, connectivity, and/or topography in a precisely aligned group average of 210 healthy young adults. We characterized 97 new areas and 83 areas previously reported using post-mortem microscopy or other specialized study-specific approaches. To enable automated delineation and identification of these areas in new HCP subjects and in future studies, we trained a machine-learning classifier to recognize the multi-modal 'fingerprint' of each cortical area. This classifier detected the presence of 96.6% of the cortical areas in new subjects, replicated the group parcellation, and could correctly locate areas in individuals with atypical parcellations. The freely available parcellation and classifier will enable substantially improved neuroanatomical precision for studies of the structural and functional organization of human cerebral cortex and its variation across individuals and in development, aging, and disease.

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