

During my research internship at Karolinska Institutet in Stockholm, Sweden, I worked with the Westman Neuroimaging Group on a project focused on the application of a brain age prediction model to clinical-grade MRI scans from subjects with varying levels of cognitive function. The primary objective of the project was to evaluate the model's performance in heterogeneous, multi-center clinical datasets and to investigate associations between brain age gap (difference between predicted brain age and chronological age) and cognitive impairment.

Over the course of the two-month stay, we applied a previously published, custom-developed brain age model to T1-weighted MRI scans from three European cohorts (Solna, Perugia, and Prague). A key methodological challenge addressed during the project was age-related bias in brain age prediction, whereby younger individuals tend to have overestimated predicted brain age, while older individuals tend to have their predicted brain age underestimated. We implemented and evaluated correction strategies to mitigate this bias. Preliminary results are promising and demonstrate a clear negative association between brain age gap and cognitive function.

On a personal level, I found the internship very beneficial as it substantially contributed to the development and refinement of my technical skills, particularly in data preprocessing, quality control, and downstream statistical analysis of neuroimaging data. The provided funding enabled on-site collaboration, where I had access to established neuroimaging databases, computational infrastructure, and a collaborative research environment, and was helpful in bringing the data processing and analysis components of the project close to completion. The work conducted during the stay is expected to result in a scientific manuscript and to form the basis for a future collaboration. Overall, in my opinion the internship met its training and research objectives and represented an effective and productive use of the allocated funding.

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