Personal Statement

Nicholas J. Tustison, DSc

I am a data scientist specializing in medical image analysis with technical expertise and international recognition in the development of high-quality, open-source computational strategies for clinically oriented research. Ever since returning to the University of Virginia in 2010, I have been the lead technical scientist for multiple projects charged with the development and deployment of computational techniques for image-oriented studies.

Following my undergraduate studies in physics and computer science, I completed master's and doctoral degrees in biomedical engineering from the University of Virginia and Washington University in Saint Louis, respectively, where my work included the development of mathematical models for quantification of lung and cardiac imaging biomarkers. I continued my post-graduate education at the University of Pennsylvania under the direction of Dr. James C. Gee, a pioneer in the area of medical image registration. While at the University of Pennsylvania, my colleague, Dr. Brian B. Avants, and I began development of the Advanced Normalization Tools (ANTs)—a software package which has become one of the most widely used toolkits in the field for imaging data munging and analysis. These contributions complement my many other software and algorithmic inclusions in the Insight Toolkit—the largest open-source, medical image analysis software package in the world with origins linked to the Visible Human Project.

Since all too often "papers are simply advertisements for the science," my colleagues and I have participated in several unbiased competitions in order to properly evaluate our work. For example, the ANTs-based Symmetric Normalization (SyN) image registration framework has been independently deemed to be a top-performing algorithm for brain, lung, and cardiac image normalization (in addition to being one of the only algorithms that can be labeled as true "open-source"). In 2013 my colleagues and I won an international competition in Nagoya, Japan for automatically segmenting brain tumors from multi-modal MRI. Most recently, in 2015, my colleagues and I developed a complete pipeline for extracting cortical thickness in the brain which has since been adopted by several research groups. These measures are extremely salient in identifying neurodegeneration in diseases such as Alzheimers and other conditions which affect brain development.

Given my role in the development of such widely used data science approaches, I have given numerous tutorials at various conferences and to such recognized groups as the Laboratory of NeuroImaging (LONI) at the University of Southern California. This has led to an expansion of my circle of collaborators beyond the University of Virginia to include a joint appointment at the University of California, Irvine and a pending appointment at the University of Pennsylvania.

I am honored to be affiliated with the University of Virginia and feel extremely fortunate to work with its high quality faculty in exploring interesting research questions. I look forward to pursuing my career path at UVa where I plan to continue focusing on innovations related to computational medical image analysis and offering crucial expertise in for imaging data science.