Teaching Health Science Professionals Computational and Data Management Skills Using Clinical Data in a Carpentries-style Lesson

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The Carpentries project comprises the Software Carpentry, Data Carpentry, and Library Carpentry lesson programs and a community of Instructors, Trainers, Maintainers, Helpers, and supporters who share a mission to teach foundational computational and data science skills to researchers.

Mission: The Carpentries builds global capacity in essential data and computational skills for conducting efficient, open, and reproducible research. We train and foster an active, inclusive, diverse community of learners and instructors that promotes and models the importance of software and data in research. We collaboratively develop openly-available lessons and deliver these lessons using evidence-based teaching practices. We focus on people conducting and supporting research.

Challenges

- Troubleshooting the conversion of exercises from kangaroo rats to human patients
- Adhering to the ADNI data use agreement requirements while planning to share the lesson materials with the Carpentries community for use at other workshops
- Keeping the essence of data carpentry themes while presenting to researchers that work with patient data

Participant Survey Data

Research Areas of Workshop Participants

- Biomedical or Health Sciences (30.50%)
- Medicine (15.56%)
- Biostatistics (10.95%)
- Neuroscience (8.08%)
- Organizational/Bioinformatics (4.37%) (Agricultural Sciences (11.11%)
- Mathematics (9.24%)
- Social Sciences (3.82%)
- Engineering (3.22%)
- High Performance Computing (2.24%)

“Good breadth of topic across different software. Good pace for the most part. Really excellent support from workshop helpers and organizers. Excellent curriculum.”

95%

“The examples and hands-on technique were very beneficial. Also using data that is applicable to our work. The amount of resources was also very helpful.”

I can write a small program/script/macro to solve a problem in my own work.

I am confident in my ability to make use of programming software to work with data.

Health Sciences Curriculum

Data Carpentry lesson:
Ecology, modified for Health Sciences

Other Data Carpentry Lessons:
Genomics, Geospatial, and Social Sciences

The goal of the Data Carpentry Health Science pilot was to create a comfortable learning environment for health science researchers that would empower them to pursue data-driven discovery.

Dataset:
Alzheimer’s Disease Neuroimaging Initiative (ADNI) *

ADNI is a global research study that actively supports the investigation and development of treatments that slow or stop the progression of Alzheimer’s disease (AD). In this multisite longitudinal study, researchers at 63 sites in the US and Canada track the progression of AD in the human brain with clinical, imaging, genetic and biospecimen biomarkers through the process of normal aging, early mild cognitive impairment (EMCI), and late mild cognitive impairment (LMCI) to dementia or AD. The overall goal of ADNI is to validate biomarkers for use in Alzheimer’s disease clinical treatment trials.

Next Steps

- The UW-Madison Carpentries Community plans to teach Health Sciences Data Carpentry in 2020.
- The UW-Madison Carpentries Community is interested in taking this curriculum “on the road”, teaching at other institutions and hospitals in Wisconsin.
- Would you like the Health Science Data Carpentry to come to your library? Let’s have a conversation.

*Data used in preparation of this article were obtained from the Alzheimer’s Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu). As such, the investigators within the ADNI contributed to the design and implementation of ADNI and/or provided data but did not participate in analysis or writing of this report. A complete listing of ADNI investigators can be found at http://adni.loni.usc.edu/wp-content/uploads/how_to_apply/ADNI_Acknowledgement_List.pdf