

Taylor D. Smith

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Programming Languages

♥Python2/3
(numpy, pandas,
pytorch, tensorflow,
matplotlib, plotly...)
R
Javascript
SQL
L^AT_EX

Experience

- 2022-Current **Institute for Biomedical Informatics (IBI), University of Kentucky** Lexington, KY
Data Management Specialist Sr.
Various responsibilities providing assistance to faculty with computational analyses and informatics, such as creating and maintaining databases and data acquisition tools, building and evaluating machine learning models, and managing large scale projects from the initial design phase through to production development.
Detailed achievements:
- Adapted deep learning model for whole body lesion detection from CT scans to identify, segment, and classify brain lesions from MRI images.
 - Developed interactive dashboards for real-time exploratory analysis of medical condition/event trends over time associated with the growth of the COVID-19 epidemic.
 - Designed database and dacquisition tools using REDCap for a longitudinal study collecting hundreds of fields of data at multiple time points. Implemented additional reporting features using the REDCap API, providing far more insight into the data.
 - Led the team for a complete overhaul of the online portal used by the Kentucky Transitions team and CHFS for their MFP program. This is used when collecting client data and provides additional reporting features, with a number of additional back-end features to support workflow management.
- 2017-2020 **Institute for Biomedical Informatics (IBI), University of Kentucky** Lexington, KY
Graduate Research Assistant
Conduct exploratory research in biomedical informatics. Primary focus was in machine learning and temporal data analysis.
Detailed achievements:
- Extracted and harmonized large-scale hospital datasets (>35k patients) for analysis of acute kidney injury (AKI).
 - Developed novel dynamic sequence alignment algorithm and population derived distance metrics for comparative analysis of AKI trajectories of variable length.
 - Developed novel machine learning tool for prediction of adverse outcomes using a variety of curated features for patients in ICU with AKI.
 - Methods of temporal and spectral analysis of EEG data for detection and characterization of sleep spindles.
- 2016-2016 **Center on Drug and Alcohol Research (CDAR), University of Kentucky** Lexington, KY
Research Assistant
Individual management and coordination of all participants in clinical research projects. Also assisted in setup, configuration, and scenario design for driving simulator software environment for subsequent projects.
- 2013-2016 **Spinal Cord and Brain Injury Research Center (SCoBIRC), University of Kentucky** Lexington, KY
Laboratory Technician
Execution of biochemical and live animal laboratory experiments and scientific write-ups. Pioneered novel development of temporal diffusion tensor imaging MRI protocol for prognosis of long-term recovery following spinal cord injury.

Education

- 2017–2020 **M.Science** in Computer Science University of Kentucky
- 2009–2013 **B.Science** in Chemistry (biochemistry option) University of Kentucky
- 2009–2013 **B.Science** in Mathematics University of Kentucky

Projects

- Mar 2023 **Complete redesign of online portal used by state employees for data acquisition and reporting.** IBI, University of Kentucky
 Online portal is for the Money Follows the Person (MFP) program, run by the state and Kentucky Transitions as a critical means of financial support to the elderly and those with intellectual disability disorders. Updated navigation to current best practice standards and greatly improved the visual design, while adding many new features and changes requested by staff using the previous version.
- Feb 2023 **Design and implementation of database and acquisition tools and provide subsequent reporting.** IBI, University of Kentucky
 Provided a master list of all variables desired for the project, designed the database structure. After incorporating the design into REDCap I incorporated advanced branching logic to the individual form structure. In addition to subsequent QC/QA and database management, I also provided multiple interactive dashboards to help understand the data.
- May 2022 **Automated detection, segmentation, and classification of brain lesions in MRI scans.** IBI, University of Kentucky
 Implemented MULAN whole-body lesion detection and analysis network for CT-scans and adapted model for brain lesions in MRI scans.
- Aug 2022 **Trend analysis of ACT medical data relative to growth of COVID-19** IBI, University of Kentucky
 Used various longitudinal and trend analysis for identifying specific medical conditions and their relationship to the growth of COVID-19 diagnoses. Created interactive dashboard for real-time exploratory analysis using those methods.
- Sep-2020 **Predicting Outcomes Following Acute Kidney Injury** IBI, University of Kentucky
 Using curated dataset (see below), develop machine learning model for prediction of adverse outcomes (e.g. hospital mortality) for patients experiencing AKI. Primarily used Python and R to develop and evaluate a classification model for risk stratification, outperforming all current standard of practice models.
- Jan-2020 **Acute Kidney Injury Trajectory Analysis** IBI, University of Kentucky
 Curate large-scale dataset and develop novel methods for construction and comparative analysis of AKI trajectories to identify distinct AKI trajectory subtypes. Also worked on novel statistical models for predictive analysis of adverse outcomes post-AKI.
- Jan-2019 **EEG Sleep Spindle Detection/Analysis** IBI, University of Kentucky
 Develop methods for detection and characterization of sleep spindles in EEG data. Completed various methods of time-frequency decomposition using Python for raw multi-channel EEG data into spectrograms and subsequent evaluation of 2D CNN classifiers using Tensorflow/Keras.
- Sep-2016 **Effect of substances on driving performance** CDAR, University of Kentucky
 Helped facilitate setup and configuration of driving simulator software environment and development of testing scenarios. Included MATLAB development and software-driven scenario design.
- Sep-2016 **Efficacy of Novel Drug for Smoking Cessation** CDAR, University of Kentucky
 Responsible for volunteer recruitment, scheduling and execution of clinical study protocol.
- Mar-2016 **Diffusion Tensor Imaging and Spinal Cord Injury** SCoBIRC, University of Kentucky
 Developed and validated novel diffusion tensor imaging MRI protocol for prediction of long-term recovery in rats following spinal cord injury using a semi-supervised approach with Unix scripting and the FSL MRI analysis library.

Mar-2016

Automated Identification of Autonomic Dysreflexia

S CoBIRC, University of Kentucky

Developed software application using Visual Basic for Applications within Microsoft Excel for analysis of continuous hemodynamic data for detection of events of autonomic dysreflexia.

Interests

Machine Learning:

Develop and/or implement machine learning tasks in Python using Sci-kit Learn, Tensorflow with Keras, PyTorch, NumPy/SciPy, etc. Also interested in more modern production-oriented ML environments.

Investigation into the Fundamentals of AI and alternative applications:

For example, considering the weights of a neural network, understanding a better/alternative way of visualizing 'what' it is learning (e.g. there is some nominal work in computer vision correlating network weights with distinct visual features). I'm also interested in using ML/AI to solve problems where the application of statistical methods might normally be the first choice.

Investigative Data Science :

Identifying key features in big data for predictive/explanatory analysis.

Skills

Diverse Scientific Background

Direct experience in applied biochemistry and animal care, coordination of clinical trial participants and protocol execution, scientific programming in domains ranging from hemodynamic temporal analysis in animals to analysis of clinical electronic health records, and various other applications of computer science in the world of Healthcare.

Programming Ability

Very good programming skills in Python, UNIX, C/C++, R, and javascript, and I am reasonably comfortable with java. Also have considerable experience with ML and data visualization libraries, including, but not limited to: Scikit-Learn, SciPy, NumPy, Pandas, Matplotlib, Tensorflow, Keras, PyTorch, Dash...

Quick Learning Capability

Quick learning of new computer science concepts and software libraries

Good in Communication

Experience working with many teams in a wide range of applied basic and clinical scientific domains.

Hobbies

Live and Electronic Music

Playing multiple instruments including guitar/piano and producing electronic music. Also enjoy attending music festivals.

Reading Technological Data Science/Machine Learning Blogs

Like Kaggle, TowardsDataScience, MachineLearningMastery...