

AI and Human Health: Natural Language Processing and Predictive Analytics subgroup

Participants

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|--------------------------|--|--|
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| Xin Feng | EHE - Human Development and Family Science | feng.88@osu.edu |
| Ping Zhang | CSE and Biomedical Informatics | zhang.10631@osu.edu |
| Doug Danforth | COM OB/BYN | Danforth.2@osu.edu |
| Mike Rayo | Integrated Systems Engineering and TDAI | Rayo.3@osu.edu |
| Kassandra Dalton | OR - Proposal Development Office | Dalton.235s@osu.edu |

Assets for NLP, AI, and Human Health

- **Jeff Agnoli**—Education, Funding and Research Development
 - agnoli.1@osu.edu
 - Show you how to get research funding, e.g. RFA from OR/CCTS/TDAI, & TCO
 - Kevin Taylor, Technology Commercialization Office, could be a resource for AI industry connections.
- **Nate Rodgers**—OSUMC IT, Predictive Models
 - nathaniel.rogers@osumc.edu
 - Operational, Request-base (time rigid)
 - Infrastructure asset
 - Get the tech in front of people
 - Modeling being kicked-off
 - Early detection sepsis models (pre-clinical)
 - Opioid-use disorders
 - Work with OSUMC as a testbed
- **Wei-Lun (Harry) Chao**—CSE
 - chao.209@osu.edu
 - Analyze Imaging
 - NLP
- **Becky Jackson**—Associate Dean for Clinical Research
 - Rebecca.Jackson@osumc.edu

- Predictive Analytics for diseases that disproportionately affect
- Very large datasets that are longitudinal
 - WHI (Women’s Health Initiatives) genomics
- Innovate Ohio platform
 - Using it for the NIH HEALing grant
 - Data enclaves
 - Interested in methodological and tools development
- **BJ Yurkovich**—Research Scientist at Center for Automotive Research (CAR)
 - yurkovich.7@osu.edu
 - AI
 - Operationalization
 - Commercialization
 - Looking at cardiac health of truck drivers
 - Need additional data for training
 - Want long-term trends
- **Srinivasan Parthasarathy**—CSE and TDAI
 - parthasarathy.2@osu.edu
 - AI Medicine projects
 - Clinical vision sciences
 - Public Crisis predictive analytics
 - Adolescent Health Project
 - Knowledge looking at big, wicked problems
 - Leading 10 post-docs
 - Lead Undergraduate program in AI
 - Cardinal Health FUZE labs
 - Interested in collaboration (and \$\$)
 - Pharmaceutical benefits manager
- **Xin Feng**—Human Development and Family Science
 - feng.88@osu.edu
 - Studies children’s regulation of emotions and the impact of parental mental health
 - Longitudinal dataset
 - Over 100 mother-child data, followed for 3 years
 - Preschool aged children
 - 2 hours of observation
- **Ping Zhang**-New hire, CSE and Biomedical Informatics
 - zhang.10631@osu.edu
 - Predictive modeling and predictive analytics
 - Sepsis work
 - OSU data
 - But also multi-size data with Boston data
 - Personalized medicine to find optimal process
 - Spent 6 years in IBM Watson AI
 - Knows what it can do for us
 - Industry experience

- Belong to medical center, working closely with the health IT team
 - Can pull data for all of OSUMC
- **Doug Danforth**—CoM, OB/GYN
 - Danforth.2@osu.edu
 - Virtual reality
 - Create virtual reality simulations for mass casualty events
 - AI virtual patient projects
 - How to interview and gather information from patients
 - Collaborate with CSE and Linguistics for NLP
 - Grant with Medicaid to make VR for patients with little English
 - ^ but with an opioid user
 - Modeling with NLU programs with CSE
 - Problem: sparse data
 - Can use this as training with stigma reduction
 - Right now mostly medication assisted treatment
 - Can we use NLP to do mental status exams for patients?
- **Mike Rayo**—Integrated Systems Engineering, Health and Rehab Sciences, TDAI
 - Rayo.3@ous.edu
 - Human machine training
 - Thinking more about humans than the analytics itself
 - Data visualization se background
 - Work with people working with PA and NLP to see where these models are vulnerable
 - Most work is in real-time work
 - Assets-process to do this work
 - Evaluate the human-machine team
 - Titrate up and down to see where the breaking point is
 - Not necessarily in healthcare
 - Human dashboarding
 - Data-driven decision-making
 - No focus on scientifically looking at this
 - Is it effective at understanding the world?
 - How are the machines interacting and informing the team?
 - Incredibly large datasets (200G a day) OSUMC high-resolution data
 - Continuous monitoring of heart, respiration and merging with patient health data (diagnosis codes, labs, meds, nurse validated data, 35-40 data elements)
 - Currently building a completely de-identified set that will be more accessible (probably 8 months away)

Link and Leverage Our Big Ideas (Looking for top three)

- **Data integration challenges**
 - We need to make foundational progress in applied science and AI
 - Foundational problem is data application
 - How is it stored currently?
 - How is it extracted?
 - Understanding the needs of each discipline
 - The need to build explainable models
 - Data processing and data collection is a huge time drainer
- **Cognitive Challenges**
 - Doug's Virtual Patient Experience
 - Big challenge is for the AI system to understand how the human is thinking
 - How can the human-machine interaction work better?
 - Explainable models and how best to explain the information to the human user?
 - E.g. how do you explain the data to a truck driver, so they know how to make decisions and understand it?
 - Mike-How should the machine explain itself? How can a human work with the machine to explain the data?
 - How can we understand these deep, complex models? How can we build trust between the clinician and trust?
 - BJ-micro-services model project
 - How do human experts deal with the problems?
- **Test the sepsis models in a lab with medical workers to test for vulnerabilities (EPIC)**
 - Interventional ethnographies
 - Put our money where our mouth is (try the sepsis models)
 - This needs to be in real time (within 15 minutes)
 - Sequel and relational data-Mike
- **NLP-Medical Clinical NLP toolkit**
 - Also could be applied to social behavioral field
 - This could also be brought back into medicine
 - Probe EHR for how people interpret the AI output and language
 - Understand why interventions don't work
- **Using NLP to identify fatigue and emotional stress with Wright-Patt for Drone workers (pilots?)**
 - Fatigue of Drone workers
 - Looking at fatigue and the behavioral impact over time
 - Looking at NLP data, to understand how they're saying it
 - Use this to find emotional stress and fatigue
 - How do you operate that in critical timing?
- **Developing a better evolution metric (Benchmarking)**
 - If there a chance to develop a better evolution metric?
 - A gradient of expertise
 - Overlap of expertise

- How do we operationalize that?
 - Benchmarking-to show illusion of progress or real progress?
- **Trying to understand different types human fatigue (in this case physical therapy) and stigma (implicit bias)**
 - Making a videogame to help medical problems
 - E.g. video game that recognizes fatigue in stroke patients during physical therapy
 - Application in social sciences: counselling/therapy and school children
 - Application: elder fatigue and risk of falling

Tools needed:

- Need a core lab for AI for a toolkit
 - CTSA, TDAI?
 - There is discussion of creating more of an AI center within Eng
 - TDAI Director starts in January-Specializes in AI
- OSU's breadth of research is impressive, but we fall short in interdisciplinary research
 - You must seed it with resources
 - Microsoft (365) Team
 - Slack
 - This needs to happen naturally
 - Microsoft 365 Team