# COLLABORATIVE COLLISION @FSU

# Artificial Intelligence and Machine Learning

# March 4th, 2020

Office of Research Development
ORD.FSU.EDU

# COLLABORATIVE COLLISION @FSU

## Agenda

| | |
|---|---|
| 4:00pm | Check-in |
| 4:15pm | Welcome Remarks |
| 4:20pm | Strategic Doing and Collaborative Collision Seed Fund |
| 4:30pm | Participant Presentations |
| 5:45pm | Networking |

# Participants

Participant posters with research profiles are available at:

**research.fsu.edu/CollaborativeCollision**

# Russell Almond
## Educational Psychology & Learning Systems
ralmond@fsu.edu

## Research Interests
- Bayesian Networks
- (Partially Observed) Markov Decision Processes
- Bayesian Statistics

## My Research Background
- Bayesian Network and Graphical Belief Functions (Dempster—Shafer models)
- Active in the *Uncertainty in Artificial Intelligence* community since 1980s
- Worked in both constructing Bayesian networks from expert models and learning from data
- Used MCMC and EM algorithms to fit complex Bayesian models
- General Bayesian Statistics

## How I Can Help Collaborators
1. I have a program *RNetica*, which is a binding of the Netica API in R. This is available for others to use:
   https://pluto.coe.fsu.edu/RNetica
   https://github.com/ralmond/RNetica
2. I have practical experience with knowledge engineering techniques for Bayesian networks. This includes the Peanut parameterized network structure:
   https://pluto.coe.fsu.edu/RNetica/Peanut.html
   https://github.com/ralmond/Peanut

## How Collaborators Can Help
Looking for users/open source contributors for RNetica and Peanut tools.

## Additional Content
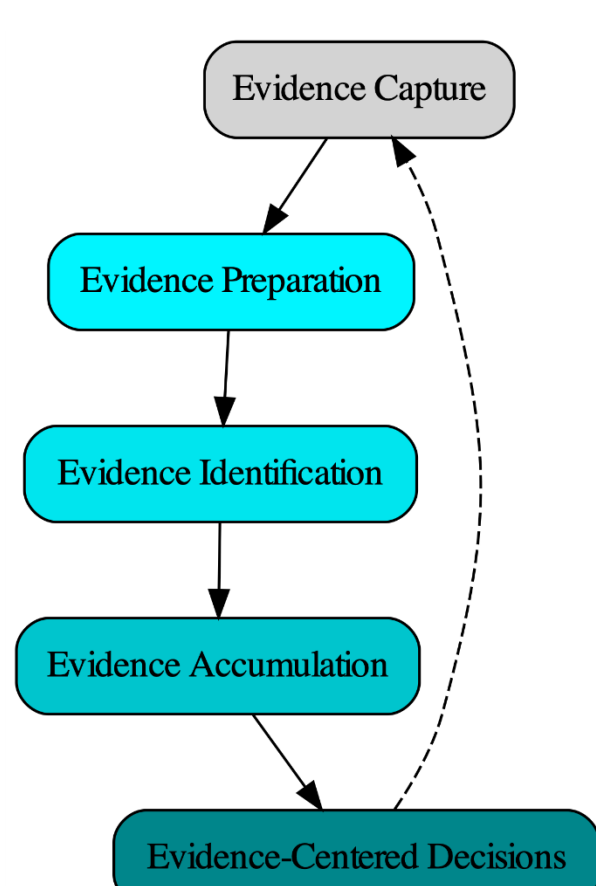


The EvidenceStream framework, still under development, looks at the process of getting evidence from a raw source into a Bayesian network, which can then be used for decision making.

# Shawn Bayern

College of Law
bayern@law.fsu.edu

## Research Interests
- Contracts, Torts, and Business Law
- Creative Uses of LLCs, particularly to accommodate new technologies

## My Research Background

I'm a law professor with an academic and practical background in computer science and software development. Most of my work isn't in technology law, but in studying modern limited-liability companies (LLCs), I recognized that they were flexible enough to be used to allow software and autonomous systems to interface with the legal system. LLCs can be established in such a way that they have no human "members" or "owners" and are controlled entirely by an operating agreement; the operating agreement can defer all decisions to the observable state of a software program; and as a result, the program can effectively "inhabit" the LLC. Because the LLC is a legal person, the software gains the functional capabilities of a legal person—owning property, entering contracts, etc. I am working on a book under contract with Cambridge University Press on this topic and have written about it in many legal-academic journals.

## How I Can Help Collaborators

- Legal and technological expertise related to autonomous systems and their interface to the legal system

## How Collaborators Can Help

- Providing domain-specific applications of my legal ideas in order to test or apply the legal techniques I have developed

## Additional Content

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**David Braithwaite**
Department of Psychology
braithwaite@psy.fsu.edu

Research Interests
- Mathematical cognition and learning
- Computational models of cognition
- Children's cognitive development

## My Research Background

I study mathematical cognition and learning among children and adults. I am currently focusing on arithmetic with fractions and decimals; relations between working memory and mathematical ability; and mathematical reasoning and proof comprehension. I employ a variety of methods including behavioral studies and computational cognitive modeling. The long-term goals of my research are to improve our understanding of how people learn and do mathematics and to identify better ways of teaching math.

## How I Can Help Collaborators

- Knowledge of psychological theories and of learning and development
- Experience with computational cognitive modeling
- Expertise in design, execution, and analysis of behavioral experiments
- Access to experimental datasets and participants (children and adults)
- Experience publishing in psychology and education-related journals
- Experience obtaining funding from National Science Foundation

## How Collaborators Can Help

- Expertise relating to any of these areas of computer science/AI:
  - ✓ Knowledge representation
  - ✓ Neural networks, deep learning
  - ✓ Language processing
  - ✓ Planning
  - ✓ Expert systems
- Expertise in educational data science
- Access to large datasets relating to math learning/education

## Additional Content
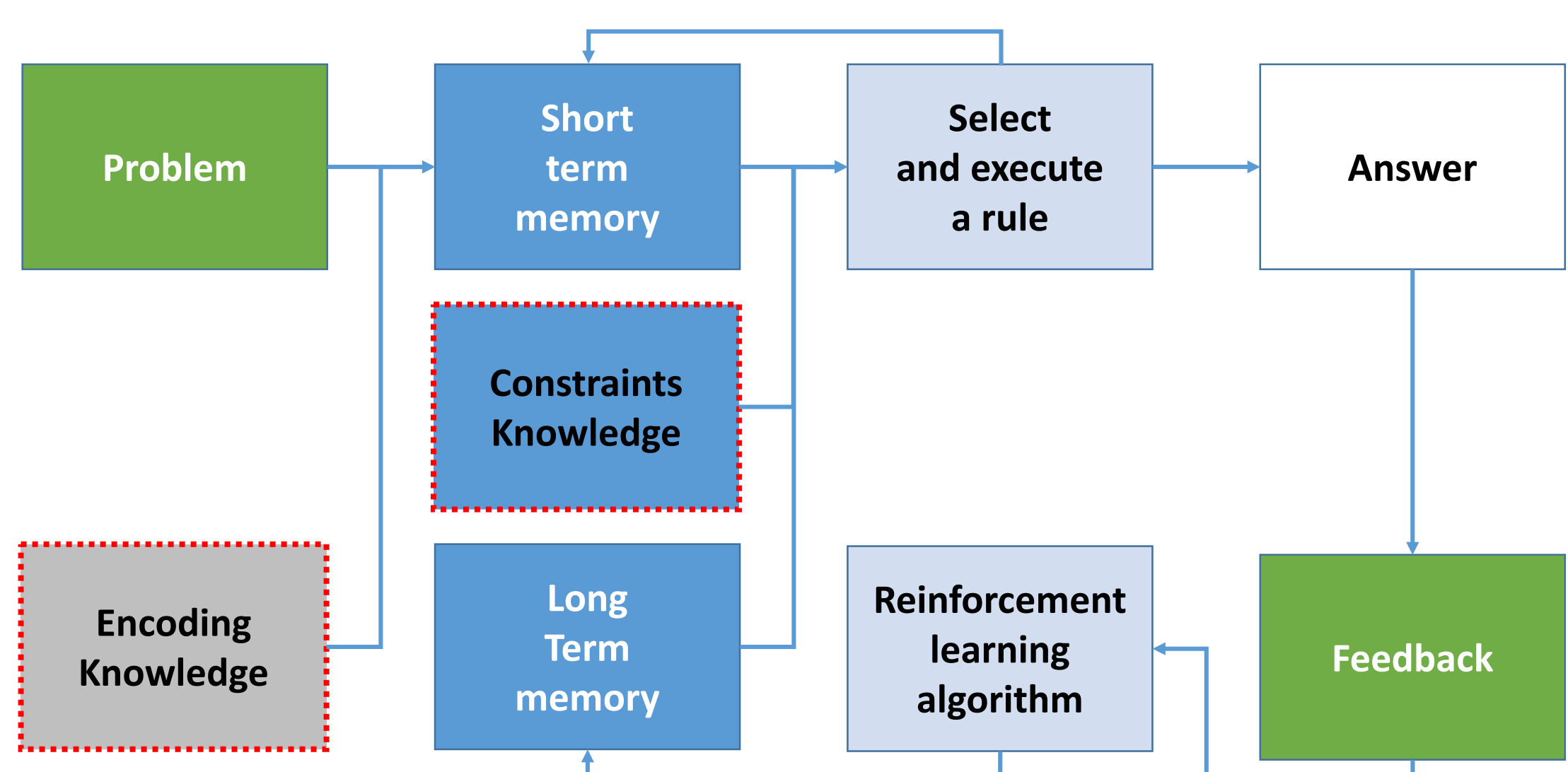
# Shayok Chakraborty

Computer Science

shayok@cs.fsu.edu

## Research Interests
- Machine Learning
- Computer Vision
- Assistive Technology

## My Research Background

My research interests include machine learning, computer vision and assistive technology. Specifically, I am interested in developing algorithms under the constraint of limited manual supervision. I am currently working on the development of novel active learning and domain adaptation algorithms by leveraging the feature learning capabilities of deep neural networks. These algorithms are being validated on a variety of applications in computer vision and assistive technology. Please visit my webpage for more details: http://shayokch.com/

## How I Can Help Collaborators

Expertise in any aspect of machine learning and big data, including but not limited to:

- Active Learning
- Domain Adaptation
- Deep Learning
- Semi-Supervised Learning

## How Collaborators Can Help

Willing to collaborate on interesting research problems, particularly in the areas of assisitive technology and smart city / environments

## Additional Content

Sample publications are listed below:

1. **S. Chakraborty**, "Asking the Right Questions to the Right Users: Active Learning with Imperfect Oracles", **AAAI** Conference on Artificial Intelligence, 2020
2. A. Bhattacharya, J. Liu, **S. Chakraborty**, "A Generic Active Learning Framework for Class Imbalance Applications", British Machine Vision Conference (**BMVC**), 2019
3. H. Venkateswara, J. Eusebio, **S. Chakraborty**, S. Panchanathan, "Deep Hashing Network for Unsupervised Domain Adaptation", IEEE **CVPR**, 2017

# Gordon Erlebacher

Department of Scientific Computing
gerlebacher@fsu.edu

## Research Interests
- Machine Learning with PDEs
- Natural Language Processing
- Innovative ideas in deep learning
- Deep Learning in Social Sciences

## My Research Background

I earned an M.S. in Physics at the Polytechnic Institute at the Free University of Brussels, and a Ph.D. in 1983 at Columbia University in the field of Plasma Physics, for which I developed an adaptive algorithm on triangular meshes to simulate containment in plasma devices. This was followed by six years at NASA Langley Research Center and another seven years at the Institute for Computer Applications in Science and Engineering. During this period, I participated in projects, such as wind tunnel design, scientific visualization, and the numerical simulation of fluid transition and turbulence. I now chair the Department of Scientific Computing. Five years ago, I switched disciplines and entered the fields of computational neuroscience and machine learning with particular emphasis on the mechanics and applications of Deep Learning. I am particularly interested in Natural Language Processing.

## How I Can Help Collaborators
- Knowledge of continuous and discrete algorithms
- Multidisciplinary background
- Broad knowledge of Natural Language Processing
- Joint development of new brain model inspired by Deep Learning
- Strong programming abilities
- Connections with industries in Panama

## How Collaborators Can Help
- Possess strong knowledge of statistics
- Offer knowledge of linguistics and semantic analysis
- Suggest large-scale or complex applied problem in need of a solution
- Combine PDEs with ML in innovative ways
- Share experience in physical modeling
- Provide knowledge of data assimilation
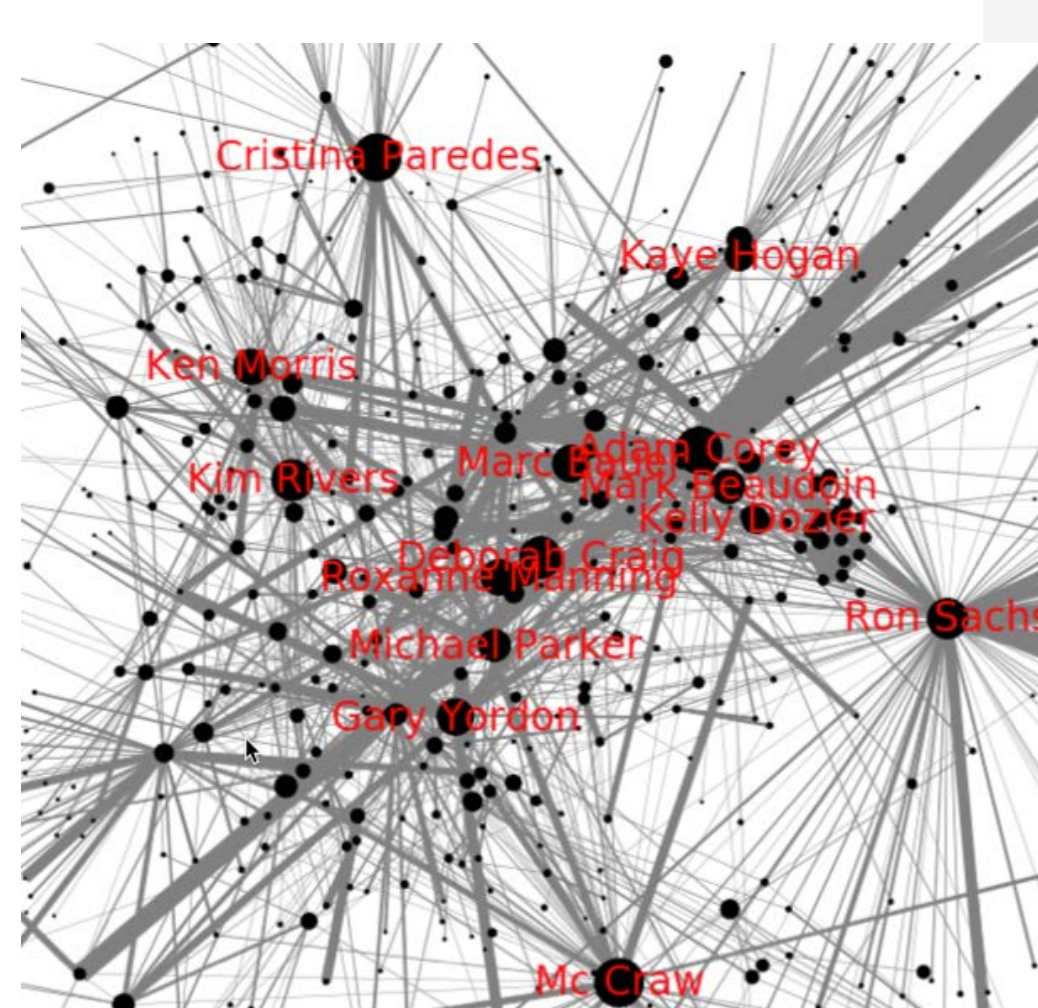- Contribute graphical modeling expertise

**Project**: *Seek to apply time-dependent embedding methods to identify deception via style identification*

POS visualization via top Three components of SVD

Email network

### Parts of Speech
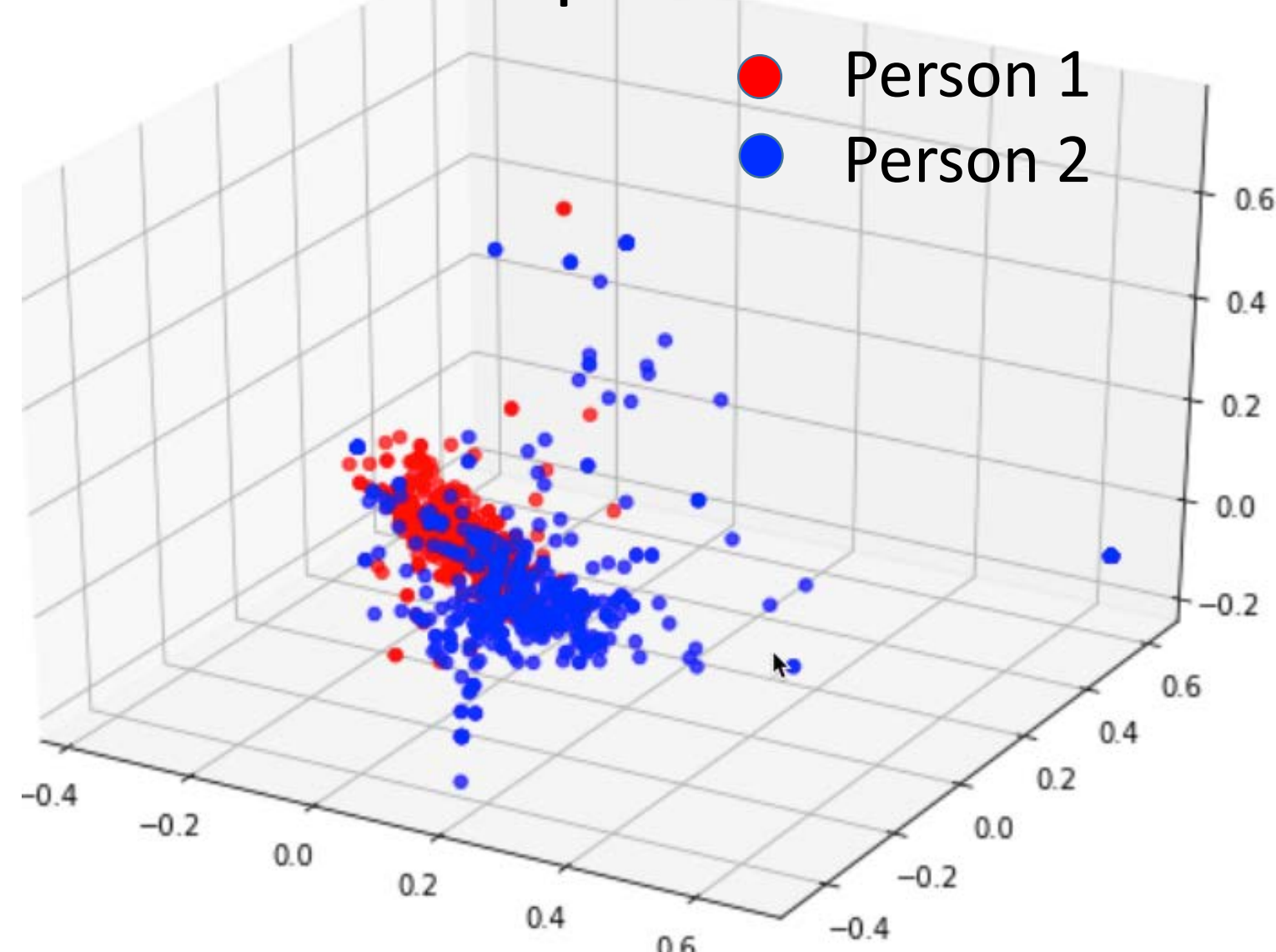
| Abbreviation | Meaning |
| --- | --- |
| CD | cardinal digit |
| DT | determiner |
| EX | existential there |
| FW | foreign word |
| IN | preposition/subordinating conjunction |
| JJ | adjective (large) |
| JJR | adjective, comparative (larger) |
| JJS | adjective, superlative (largest) |
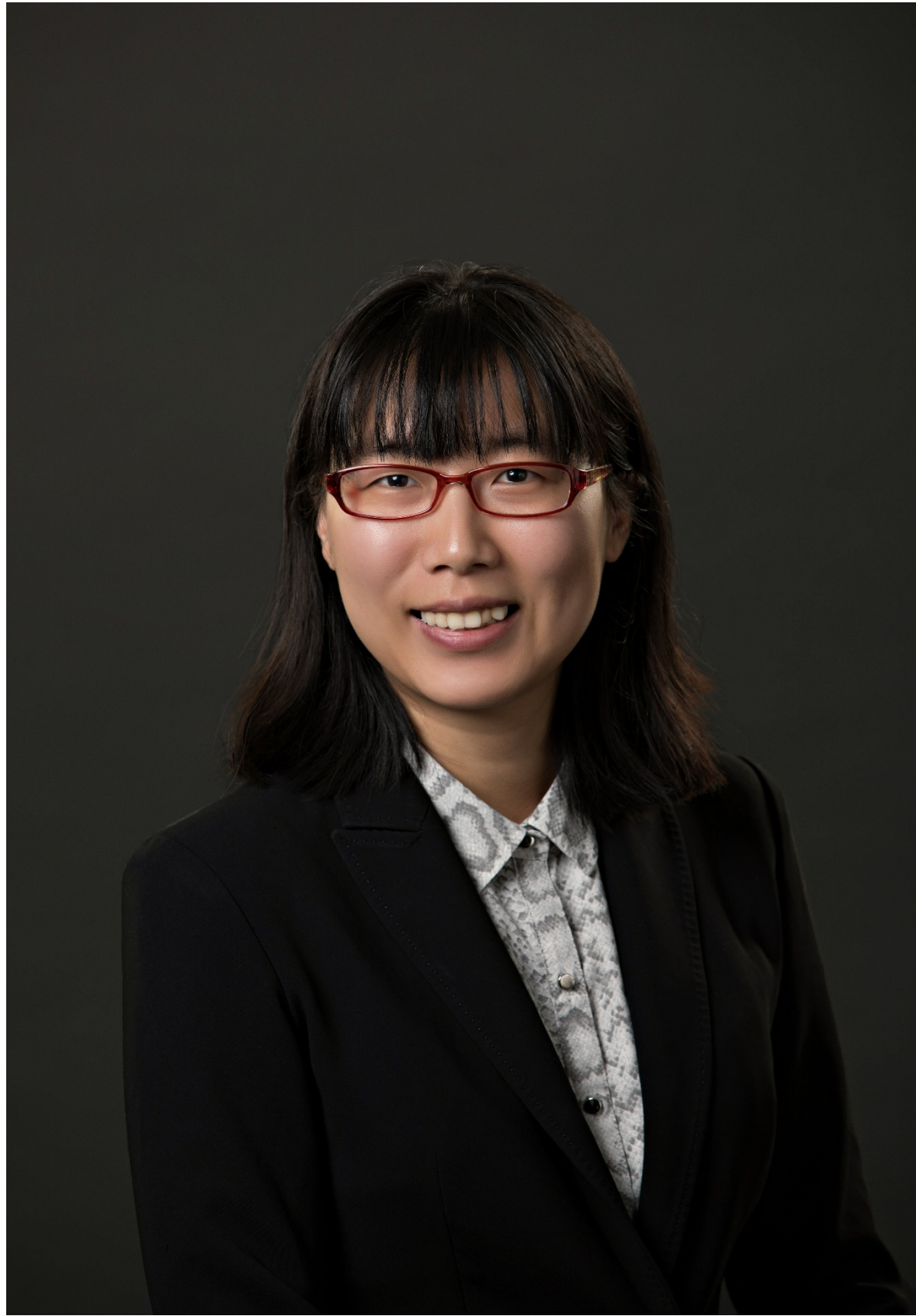
# Kerry Fang

Urban and Regional Planning
lfang3@fsu.edu

## Research Interests
- Urban Innovation
- Economic development
- Land use policy

## My Research Background

My research has focused on two areas: 1) exploring the magnitude and mechanism of urban agglomeration; and 2) examining the effectiveness of policy tools to advance sustainable and inclusive economic development. These efforts have afforded my bridging the theories and empirical evidence of urban agglomeration with the policy practice of stimulating and sustaining economic development through intelligent business strategy, improved urban design, and effective land use policies.

## How I Can Help Collaborators
- Deep understanding in urban policies, planning and political process
- Expertise in studying labor market
- Advanced statistical and spatial analysis
- Data science skills in visualization and text mining
- Mixed-method research design
- Extensive relationships with collaborators in and outside of academia
- Rich experience in cross-country comparative studies

## How Collaborators Can Help
- Access to dataset
- Database development and management
- Machine-learning skills
- Interdisciplinary approach
- A research team of students and postdocs that can efficiently move projects forward

## Additional Content

I'm looking for collaborators on the project studying AI's implications on the future of work. Given my own expertise in labor market analysis and policy analysis, I'm looking for collaborators either (1) have expertise in AI, or (2) have access to unique dataset for analyzing skill requirements in different occupations.

# Fengfeng Ke

Educational Psychology & Learning Systems

fke@fsu.edu

## Research Interests
- Mixed reality and cyberlearning
- Digital game-based learning
- Adaptive e-learning

## My Research Background

My research focuses on the investigation of innovative and effective learning systems for interdisciplinary, lifelong learners. I am particularly interested in examining the dynamics governing the relations among neurodiverse learners, the design and implementation of personalized and engaging learning systems, and cognitive, metacognitive, and affective learning outcomes. My research has embodied this perspective in three streams of work – digital game-based learning, inclusive design of adaptive e-learning, and mixed-reality integrated immersive learning – for a diversified learner population..

## How I Can Help Collaborators

- Innovative learning systems and technologies design
- Successful history of funding from federal agencies
- Mixed-methods design
- Experience with educational data mining

## How Collaborators Can Help

- Explore challenges in the field
- Interdisciplinary approaches
- Experience with virtual human design or research
- Machine learning
- Interdisciplinary approaches

## Additional Content

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# Elizabeth (Liz) Hammock, PhD
Department of Psychology
ehammock@fsu.edu

Research Interests
- Social behavior
- Brains
- Development



## My Research Background

I use rodents to conduct research on the neural mechanisms of social behavior development.  We <u>manipulate</u> and <u>measure</u>:

| | |
|---|---|
| genes | proteins |
| circuits | activity |
| behavior | environment |



## How I Can Help Collaborators

- Expertise in the "social brain".

- Generate high quality and quantity raw data on social behavior interactions and high sampling resolution mesoscale anatomy in rodents for machine learning/data extraction.
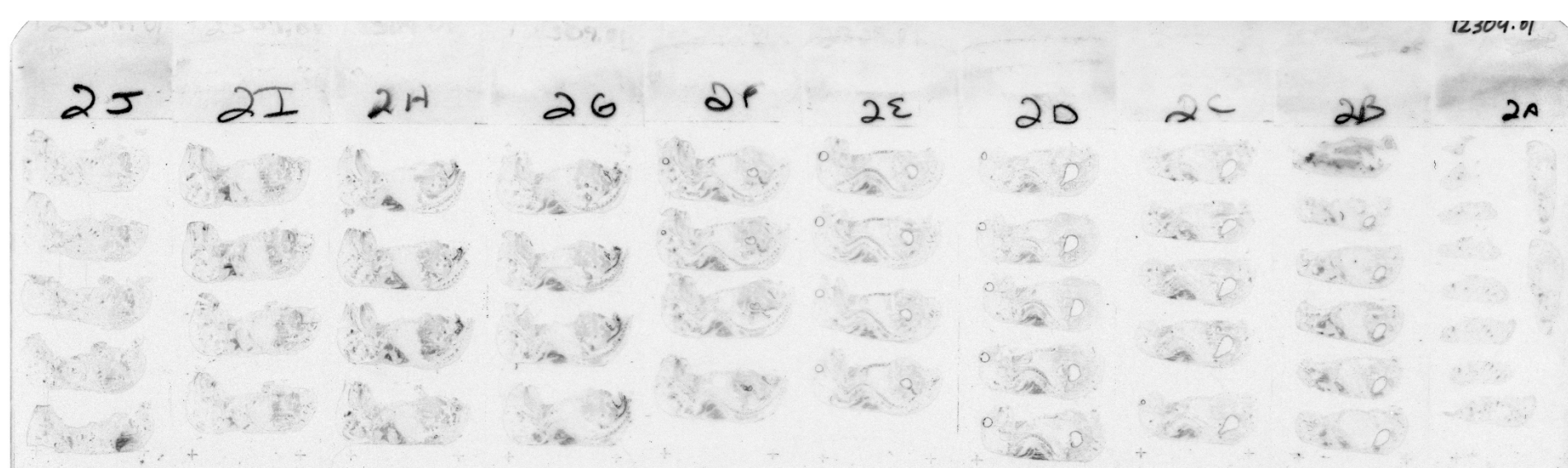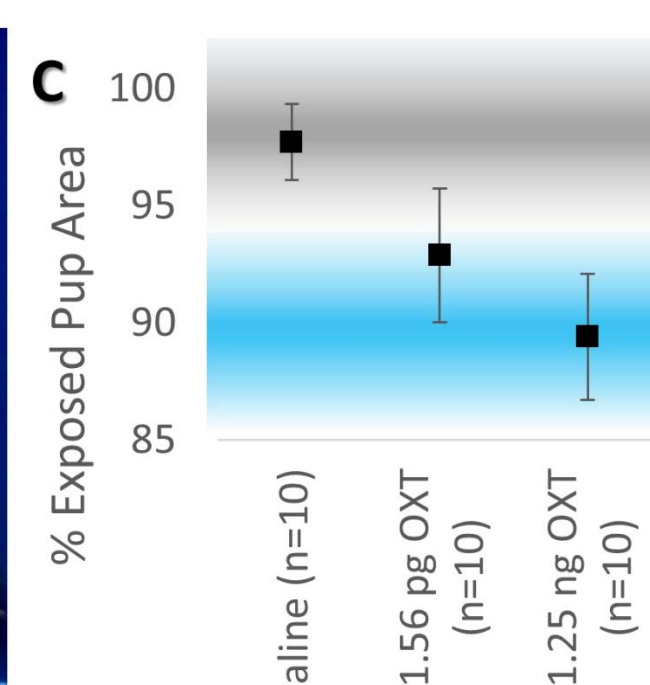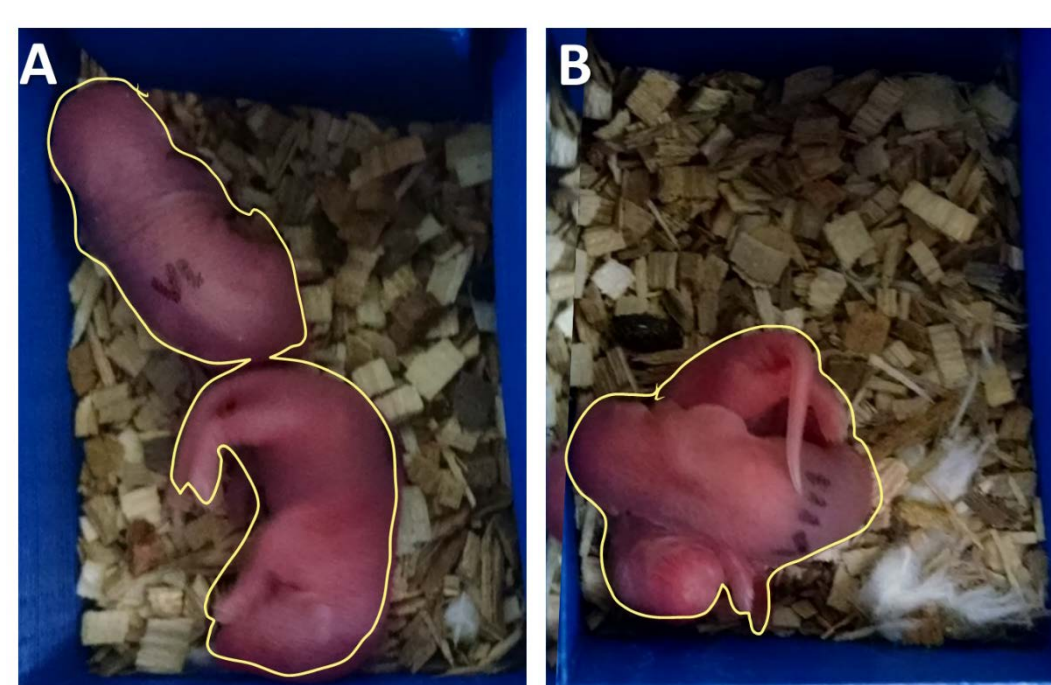


## How Collaborators Can Help
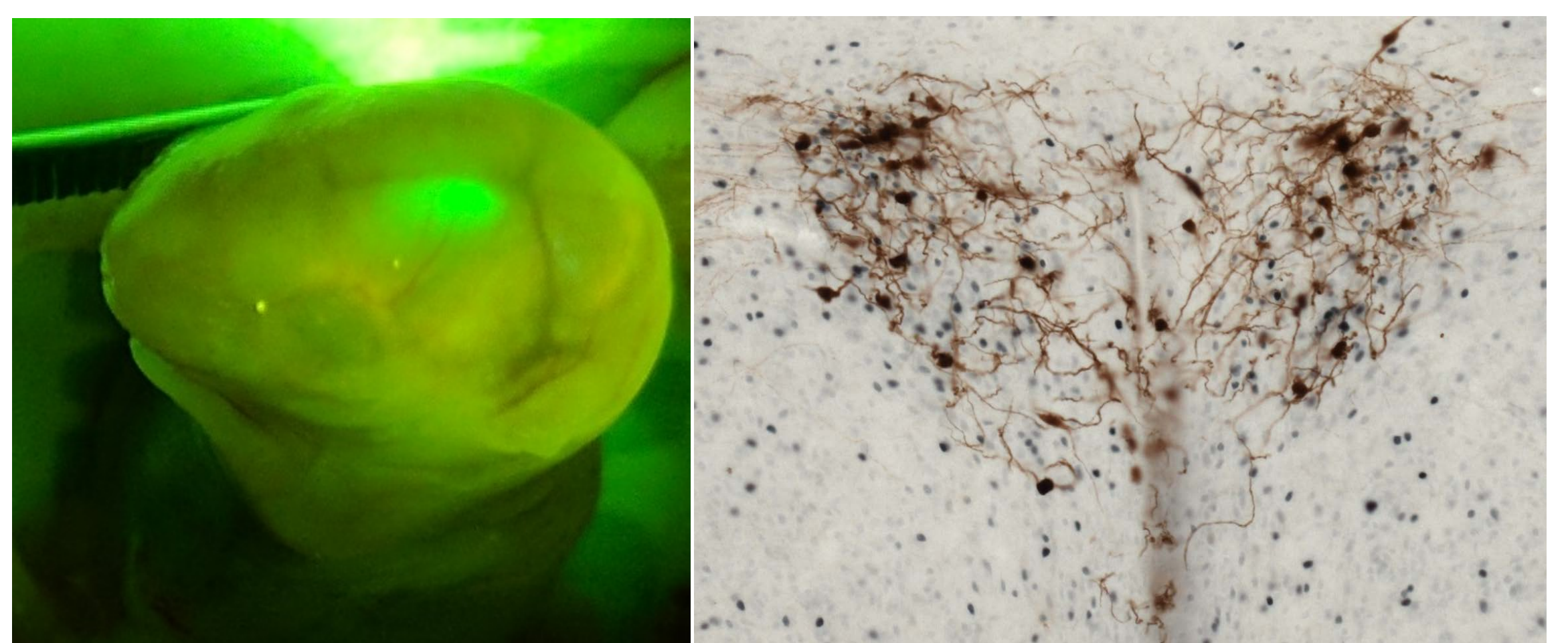
User friendly software for:
- Rapid 3D reconstruction and template registration of mesoscale anatomy, with quantification of size and density.

- Machine learning for unbiased behavioral assessment from videos.
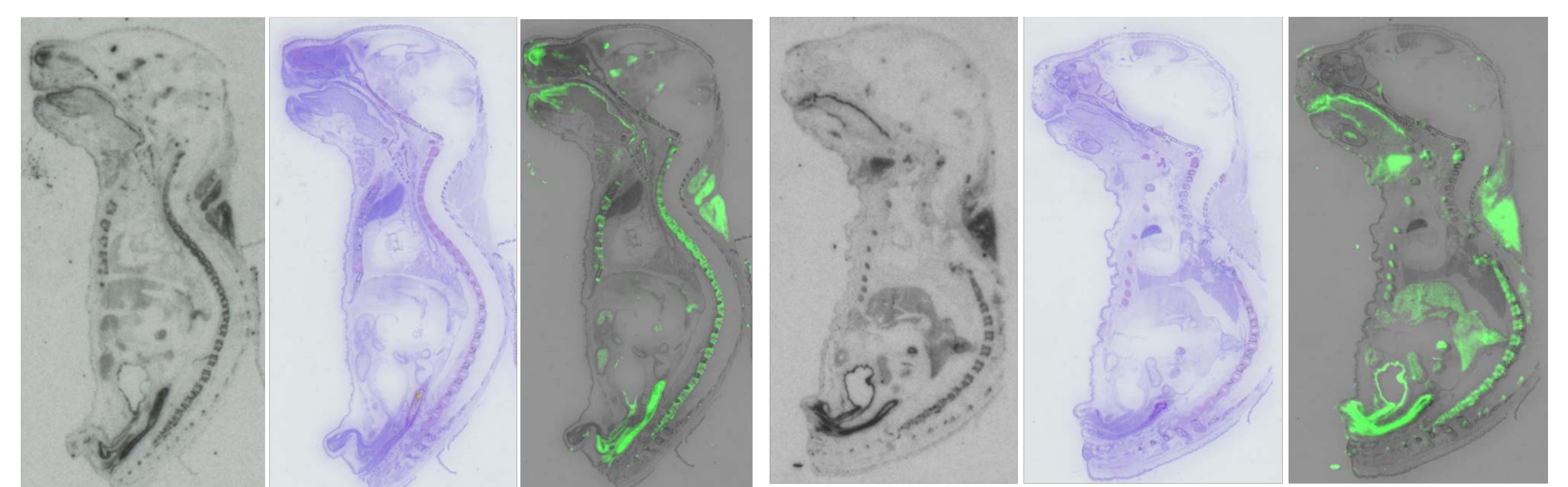


## Additional Content



Orally-applied OXT enhances social contact behavior at P0

## Charles Hofacker
## Marketing/College of Business
## chofack@business.fsu.edu

### Research Interests
- Digital Marketing
- AI Applied to Marketing
- Marketing Analytics

## My Research Background

My PhD is in Mathematical Psychology from UCLA. During grad school, I worked in information technology, first as a programmer, then later in user services. I switched from psychology to marketing because I was interested in human choice processes. When the Internet came upon the scene in the early 90's, I shifted my career towards what is now called Digital Marketing. I have published in marketing journals about gamification, AI and customer relationship management, voice interfaces, the role of software in marketing, robots, and various other topics at the intersection of IT and marketing.

## How I Can Help Collaborators

I have an encyclopedic, up-to-date citation library of any paper that matters on digital marketing

I can position any manuscript for which the business implications matter

I have some insights into the social implications of business decisions

I have a wide-ranging knowledge of most of the statistical and mathematical techniques used in the social sciences.

## How Collaborators Can Help

You could take the ball and run with a variety of data sets that I have pertaining to how people rate front-line service employees on digital media like Twitter.

My colleagues in the Marketing Department are always interested in folks who can apply analytical techniques from computer science to business problems.

## Additional Content

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COLLEGE of BUSINESS
Marketing Department
FSU BIZ
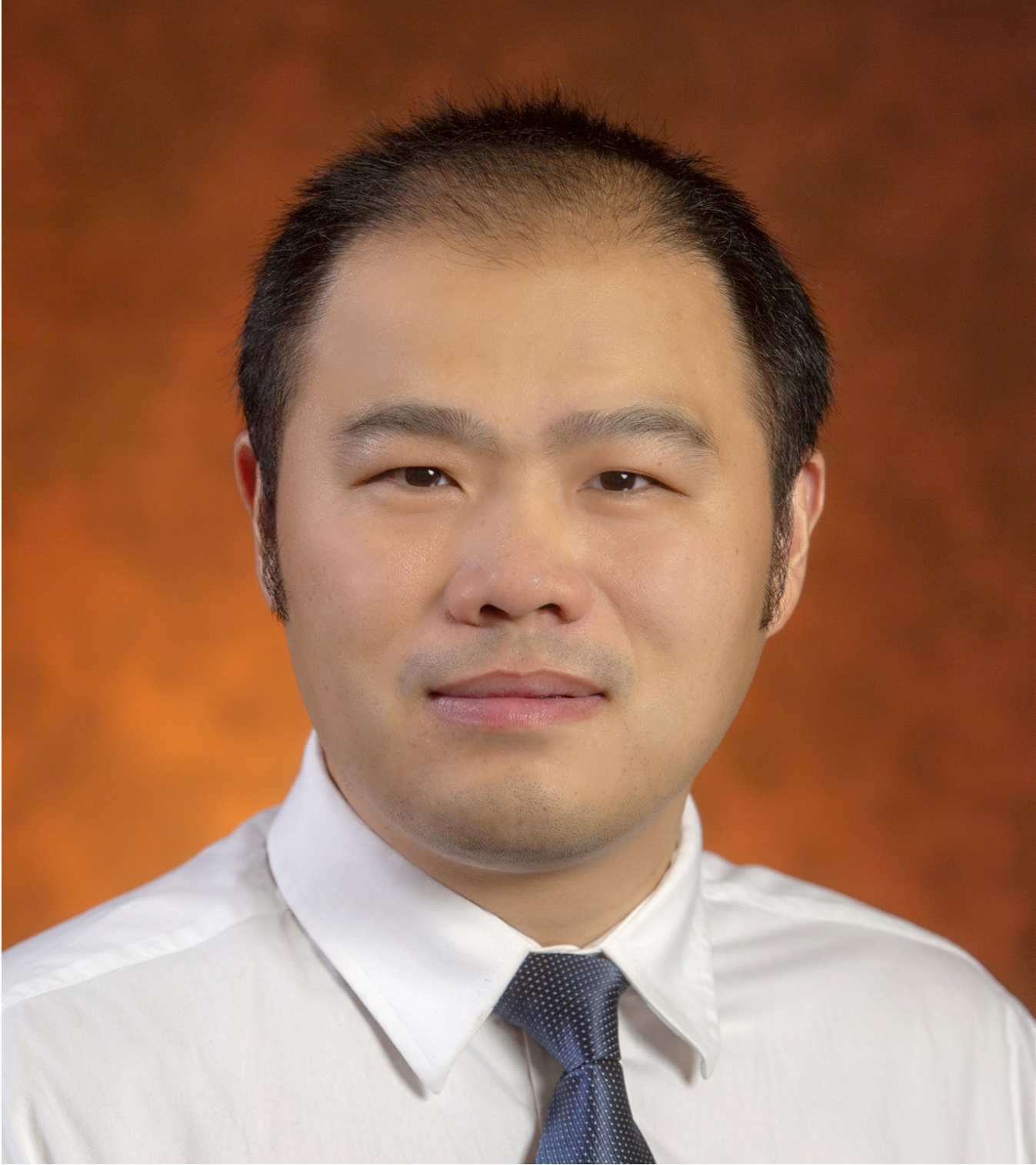
# Chao Huang

Department of Statistics
chuang7@fsu.edu

## Research Interests
- Biomedical Data Analysis
- Big Data Integration
- Machine Learning

## My Research Background

My research interests mainly focus on statistical learning of large-scale biomedical data including clinical, imaging, and genomic data. The goal of his research is to develop novel statistical methods and machine learning (deep learning) algorithms for analyzing data with complex structures. These statistical methods and computational tools can help us understand the disease progression and improve clinical trials for the treatment and early prevention.

## How I Can Help Collaborators

- Statistical Consulting

- Advanced Statistical Modeling

- Data Mining via Machine Learning & Deep Learning

- Experience publishing in top journals

## How Collaborators Can Help

- Access to populations/dataset

- Explore challenges in the field

- Interdisciplinary approaches

## Additional Content

- **More information can be found from my website!**

https://sites.google.com/view/chao-huang/

Gerry Maitland, M.D.
College of Medicine, Department of Clinical Sciences
Gerry.Maitland@med.fsu.edu

Research Interests
- Contrast Sensitivity Visual Defects in Neurodegenerative Diseases
- Balance Disorders in the Elderly
- Freezing and Parkinsonism

# My Research Background

My interest is primarily in clinical research. For several years, in collaboration with Dr. Leonard Lapointe, we have studied the effects of cognitive resource allocation on motor performance in Parkinsonism. Along the same line, we have completed a longitudinal study on contrast sensitivity visual performance and its failure in individuals with Parkinsonism. More recently, in collaboration with a number of colleagues, I have investigated the efficacy of the dance, Argentine tango, as a physical therapy rehabilitation tool. Current studies, in collaboration with the Institute of Sports Sciences & Medicine and the Aero-propulsion, Mechatronics, and Energy Center, include: the effect of caffeine on motor performance in Parkinsonism, and the use of a vibrational armband stimulation to enhance gait performance. In association with my colleagues at Biomedical Sciences and Computer Science, we are studying the use of inertial gait data to detect freezing of gait in Parkinsonism.

# How I Can Help Collaborators
- Clinical expertise in Neurology and Neuro-Ophthalmology
- Large population base
- Access to unique equipment and diagnostic tools

# How Collaborators Can Help
- Interdisciplinary approaches
- Study designs
- New insights in my field of interest
- Novel technologic developments

# Additional Content

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Anke Meyer-Baese
Scientific Computing
ameyerbaese@fsu.edu

Research Interests
- Brain data analysis
- Dynamic graph theory
- Temporal networks
- Advanced machine learning

## My Research Background

My research interests lie in brain data analysis and modeling with application to neurodegenerative diseases such as depression, schizophrenia and dementia. I have applied advanced dynamical graph theory, temporal graph networks and modern control mechanisms to determine disease foci, and diffusion models and epidemic spreading modeling to predict disease spread.

## How I Can Help Collaborators

- Advanced brain data analysis
- Expertise in dynamic graph theory
- Determine foci of disease propagation
- Models for disease propagation
- Advanced machine learning techniques

## How Collaborators Can Help

- Provide fMRI, EEG or MRI data
- Research in neurodegenerative diseases
- Clinical background

Left: Functional data preprocessing.  Right: Disease leader nodes in controls (A), MCI (B) and AD (C) functional networks.
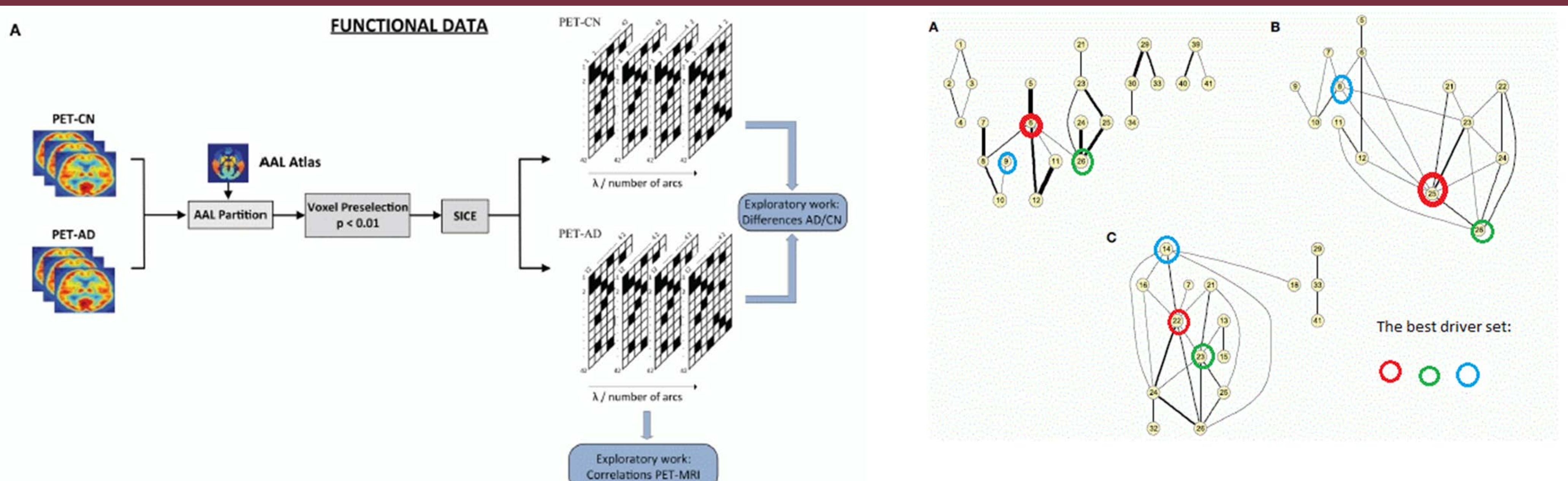
Olmo Zavala-Romero
Center for Ocean-Atmospheric
Prediction Studies
ozavala@coaps.fsu.edu

Research Interests
- Deep Learning in Oceanography
- Computer Vision
- High performance computing

## My Research Background

I developed a Semi-Supervised machine learning algorithm based on the classic Naïve Bayes classifier, during master studies in Computer Science. More recently, I have been working on an operational air quality forecast model for Mexico City, using Dense Neural Networks for the model and historical data from pollution stations joined with numerical meteorological data as input.

Besides the interest in earth sciences, I have a passion for medical imaging; in this area, I recently worked on deep learning algorithms for the automatic segmentation of prostate zones and kidneys. Additionally, I have experience with automatic detection algorithms of breast and prostate cancer using radiomics and genomics as input for machine learning models.

## How I Can Help Collaborators

- Deep Learning/Machine Learning
  - Experience in the fields of Medical Imaging and Earth Sciences.
- Scientific programming (Python, Matlab, Julia, etc.)
- Data analysis: optimization, pre and post-processing, normalization, visualization, statistics, web interfaces, etc.
- Design and development of databases and spatial databases (PostGIS, MySQL, Oracle, etc.)
- Experience publishing in top journals.
- Web development.
- Numerical modeling.

## How Collaborators Can Help

- Funding opportunities.
- Specific problems in other fields that are well suited for Machine Learning (big and complicated data).
- Writing successful NSF/NIH proposals.

## Additional Content
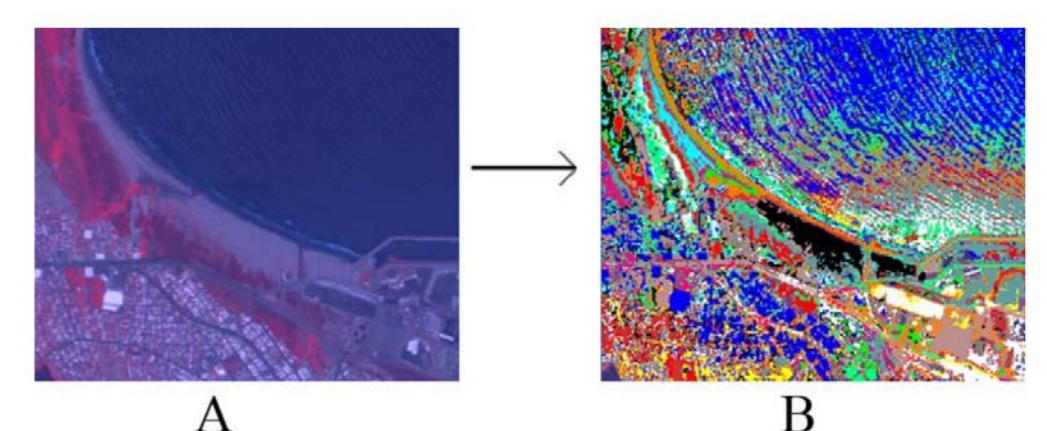
Medical image segmentation with Deep Learning



DSC 0.903
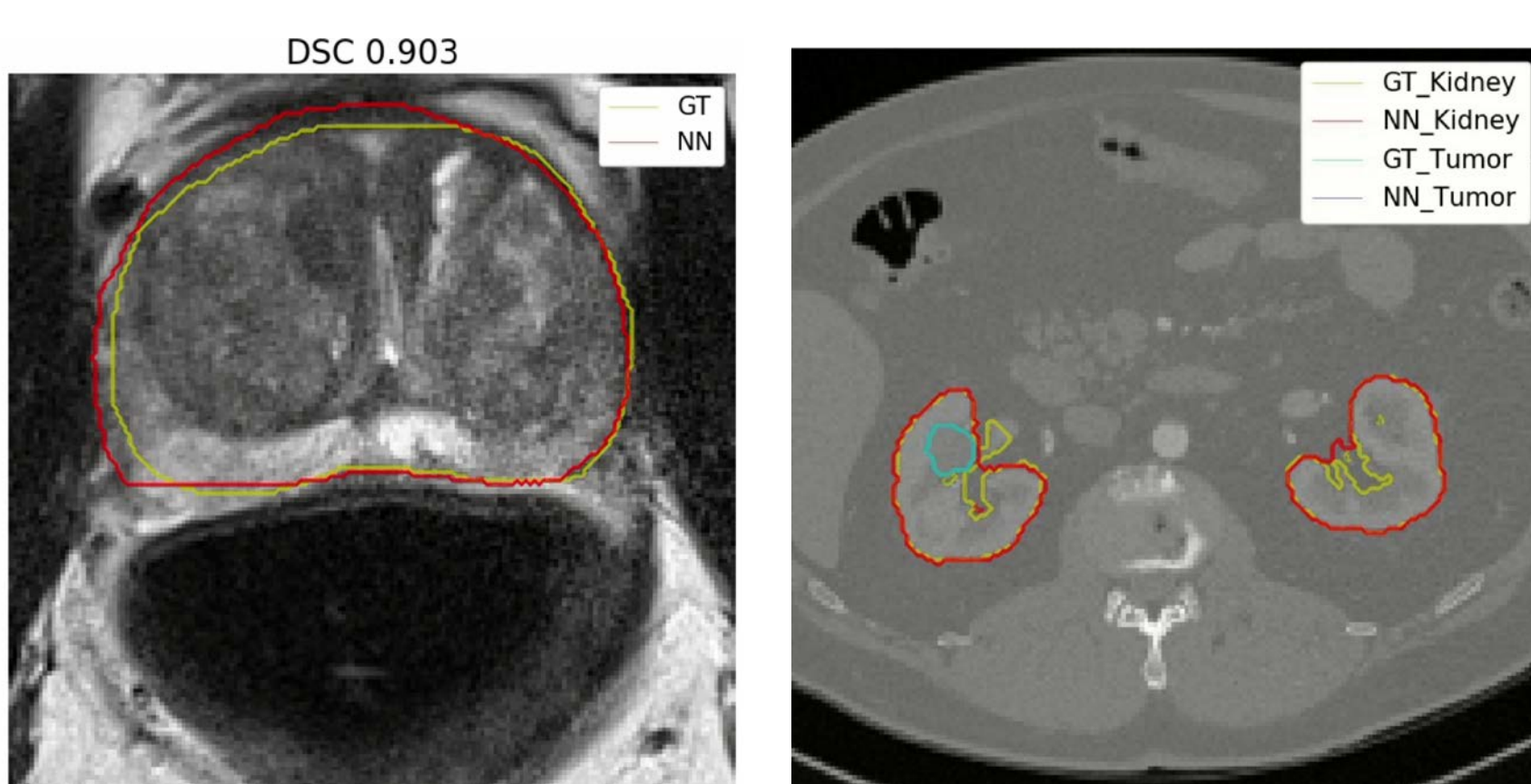
Machine Learning

24 hr Ozone forecast with NN



Land use classification with ML



A          B

Web GIS Visualization

# Shuyuan Mary Ho

School of Information

smho@fsu.edu

## Research Interests

- Trusted human-computer interaction
- Predictive analytics
- Computer-mediated deception
- Cyberbullying, political polarization

## My Research Background

My research interests are in trusted human-computer interactions, specifically addressing issues of computer-mediated deception, cyber insider threats, disinformation, and cyberbullying. Recent projects include the study of predictive analytics for identifying online deception and cyberbullying in social forums, as well as polarization in political forums. My iSensor Lab analyzes and extracts language-action cues, such as in charged language for identifying hate speech. I apply Machine Learning and Artificial Intelligence to help detect, compare and make predictions in a way that humans can't. Based on system design principles, we identify subtle but noticeable differences in communicative intent that can be observed, triangulated and codified. I build research experimentations on top of this, in the form of online games that allow us to collect conversational artifacts from social simulations, and analyze it within a complex systems framework. This work has significance for social computing, information systems, as well as pragmatic research on linguistic and natural language processing to identify social intent that is not explicitly stated.

## How I Can Help Collaborators

- Mixed-methods research design
- Scenario-based experimentation
- User-centered system design
- Online game design for data collection
- Data analytics, social computing
- Behavioral modeling & prediction
- Interdisciplinary approaches
- Grant-writing

## How Collaborators Can Help

- Bring your biggest problems for analysis
- Access to big datasets (e.g., healthcare, social data, utilities, etc.)
- Machine learning, artificial intelligence
- Statistical analysis and modeling
- Coding and programming
- Access to and knowledge of Blockchain technology/environment

## Additional Content

I founded the iSensor Lab in 2010 to conduct sociotechnical research related to human factors in cyberspace. Experiments are conducted in live and virtual environments using online games. Research data is collected through confined resources and interactions that are based on real-world cyber trust and deception simulations. We generate data based on real world scenarios that are created for specific purposes. This is done through the deployment of online games that contain identical variables as in real-world situations. Statistical modeling and machine learning are used to parse out the cues of conversations and make sense of the data collected.


ISENSOR LAB

FUN HOUSE
CYBER LAB
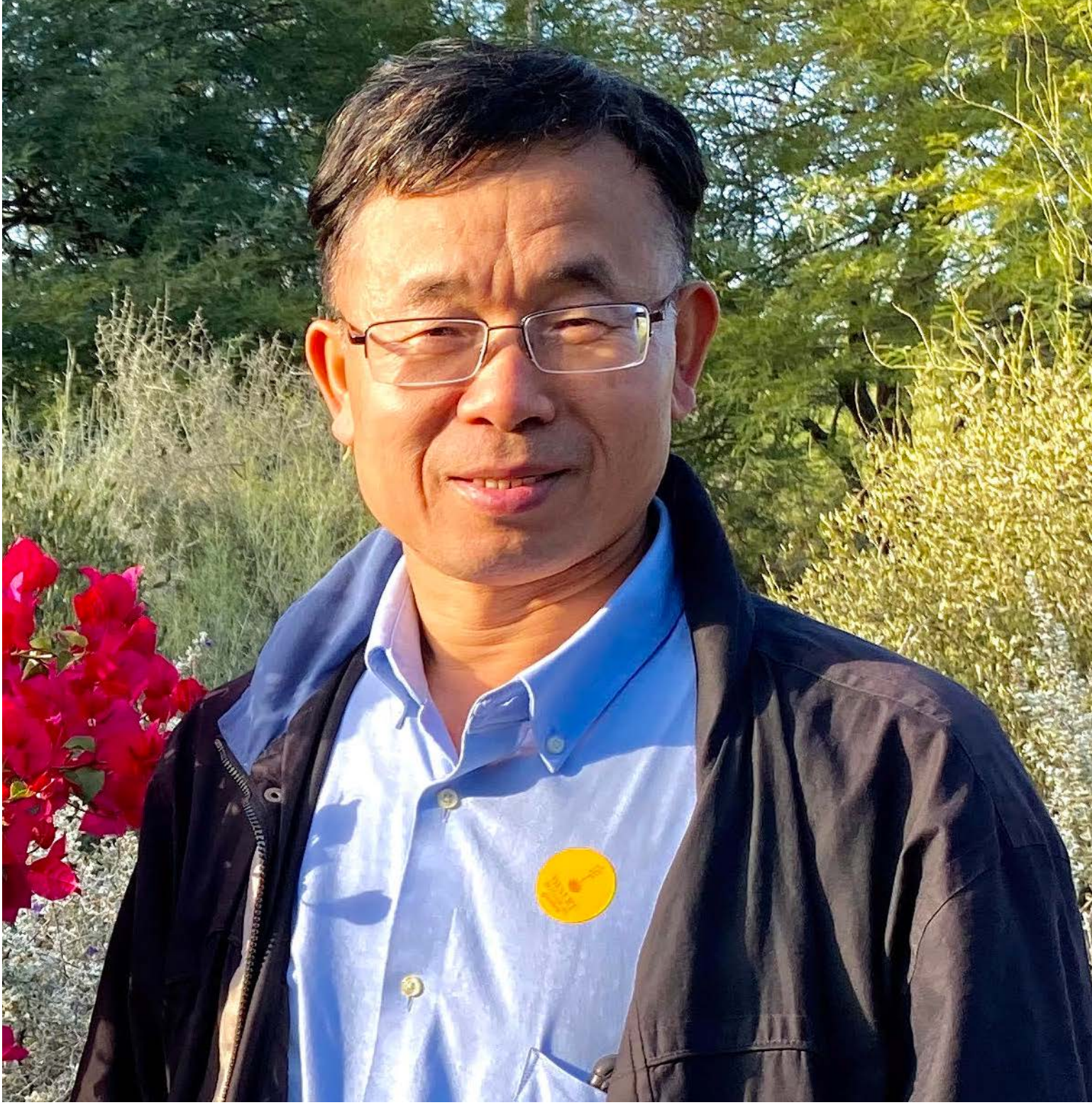
# Xiuwen Liu

Professor, Computer Science
liux@cs.fsu.edu

## Research Interests
- Intrinsic deep learning
- Computational models for NLP
- Deep learning for cyber security

## My Research Background

I have worked on machine learning, pattern recognition, computer vision, and cyber security for 20+ years. My recent interests are to develop intrinsic deep learning algorithms to overcome the fundamental limitations of accidental deep learning. While existing deep learning methods are empirically very successful, they are "accidental" in nature in that they learn their parameters based on optimizing surrogate objective functions. In addition, due to their end-to-end training, what the methods have learned are not comprehensive to experts, limiting their underlying interpretability and utilities in scientific and critical applications. My recent efforts focus on characterizing and quantifying inherent generalization of deep learning models and explore their applications to many areas including cyber security, reinforcement learning, natural language processing, and more.

## How I Can Help Collaborators
- Deep learning and machine learning expertise
- Development, implementation and analysis of machine and deep learning based solutions
- Experience with training deep neural networks for classification and recurrent neural networks for sequence modeling
- Development of new deep learning architectures and training algorithms
- Inner workings of deep learning and natural language processing models
- Cyber security expertise
- Reinforcement learning expertise

## How Collaborators Can Help
- Interesting and significant applications where machine learning methods can have a big impact
- Development of center-scale research projects in machine learning
- Emerging areas where data are abundant and new analysis tools are needed
- Interesting applications of natural language processing for social media platforms
- Customized semantic search problems
- Reinforcement learning problems in computational engineering
- Deep and reinforcement learning problems for automated learning

## Additional Content

I have a number of PhD students working on deep learning fundamentals, malware and program analysis, and natural language processing. They together have developed and implemented a number of algorithms and models. They can help and work with your students on machine learning research.

I also have many years of collaborative research experience and a number of joint research projects in Engineering, Mathematics, Biology, Medicine, and more.

My group has also a number of dedicated GPU workstations and servers that are capable of training large scale deep learning models.
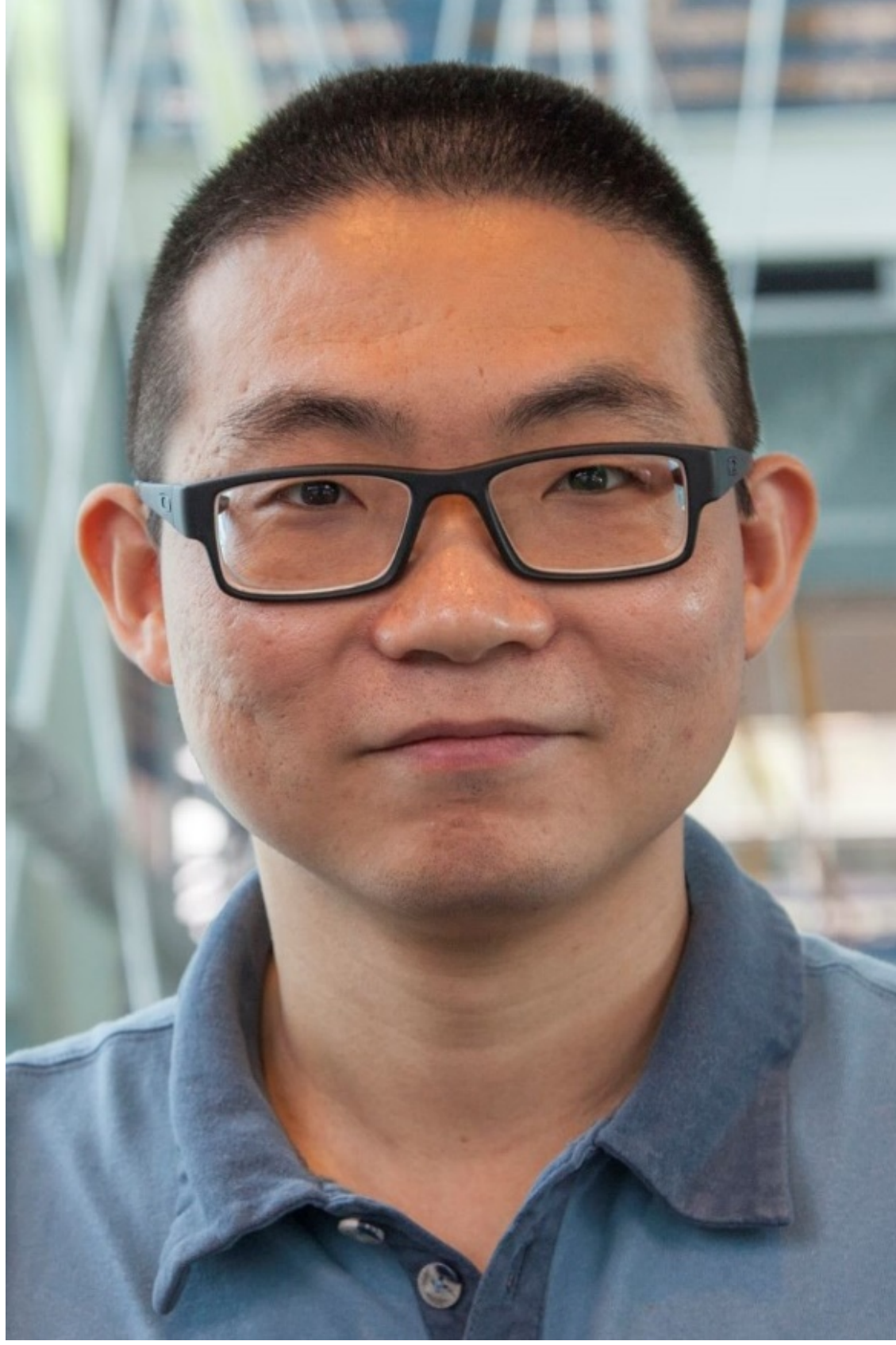
# Yanjun Shi
## Center for Advanced Power Systems
yshi3@caps.fsu.edu

## Research Interests
- Power Electronics
- Wide Bandgap Power Semiconductor
- Renewable Energy
- Electric Transportation

## My Research Background

My background is electrical engineering with a focus on power electronics. In the past 7 years after my Ph.D., I have been working on design and control of high efficiency compact power electronics converters. My research interests include grid-connected photovoltaic systems, wide bandgap based power converters, multilevel power converters, and advanced control for power converters.

I am a research faculty and a principal investigator who is continuously exploring new research opportunities.

## How I Can Help Collaborators
- High performance power electronics converter/inverter design
- Microgrid and nanogrid power system design and analysis
- Energy conversion and grid connection for renewable energies
- Circuit simulation and realtime simulation
- Microprocessor based control system design and programming
- Magnetic design
- Electromagnetic compliance (EMC)
- PV, Wind turbine, Energy Storage, Electric Vehicle, Electric ship, and Electric Aircraft

## How Collaborators Can Help
- Explore challenges in the field
- Interdisciplinary approaches
- Joint funding application

## Additional Content

1. Y. Shi, Y. Zhang, L. Wang, and H. Li, "Reduction of EMI Noise due to non-ideal interleaving in a 100kW SiC PV Converter," *IEEE Trans. Power Electron.*, vol. 34, no. 1, pp. 13-19, Jan. 2019.

2. Y. Zhang, Y. Shi, Phase-Shifted Square Wave Modulation (PS-SWM) for Modular Multilevel Converter (MMC) and DC Transformer for Medium Voltage Applications," *IEEE Trans. Power Electron.*, vol. 34, no. 7, pp. 6004-6008, July 2019.

3. Y. Shi, L. Wang, H. Li, "Stability Analysis and Grid Disturbance Rejection for a 60kW SiC based Filter-less Grid-connected PV Inverter", *IEEE Transactions on Ind. Appl.*, vol. 54, no. 5, pp. 5025-5038, Sept.-Oct. 2018.

4. Y. Zhang, Y. Shi, and H. Li, "EMI Noise Separation Method for Three-Phase WBG Inverters with Low Sensitivity to Parasitic Parameters," *IEEE Trans. Power Electron.*, vol. 33, no. 6, pp. 4589-4593, June 2018.

5. L. Wang, Y. Shi, and H. Li, "Anti-EMI Noise Digital Filter Design for a 60 kW 5-level SiC Inverter without Fiber Isolation," *IEEE Trans. Power Electron.*, vol. 33, no. 1, pp. 13-17, Jan. 2018.

6. L. Wang, Y. Shi, Y. Shi, R. Xie, H. Li, "Ground Leakage Current Analysis and Suppression in a 60 kW 5-level T-type Transformerless SiC PV Inverter," *IEEE Trans. Power Electron.*, vol. 33, no. 2, pp. 1271-1283, Feb. 2018.

7. Y. Shi, Y. Shi, L. Wang, R. Xie, and H. Li, "A 60-kW 3-kW/kg 5-Level T-Type SiC PV Inverter with 99.2% Peak Efficiency", *IEEE Trans. Ind. Electron.*, vol. 64, no. 11, pp. 9144-9154, Nov. 2017.

8. Y. Shi, Y. Li, T. Kayiranga, H. Li, "Exploring the LCL Characteristics in GaN Based Single-L Quasi-Z-Source Grid-tied Inverters," *IEEE Trans. Ind. Electron.*, vol. 64, no. 10, pp. 7758-7768, Oct. 2017.

9. Y. Shi, R. Xie, L. Wang, Y. Shi, H. Li, "Switching Characterization and Short-Circuit Protection of 1200V SiC MOSFET T-Type Module in PV Inverter Application," *IEEE Trans. Ind. Electron.*, vol. 64, no. 11, pp. 9135-9143, Nov. 2017.

# Yuan Wang

Department of Biomedical Sciences, College of Medicine

yuan.wang@med.fsu.edu

## Research Interests
- Brain development
- Prenatal alcohol exposure & autism
- Sensory information processing

## My Research Background

My long-term research interest is to explore principle mechanisms that guide the development of a healthy brain, by determining how brain units (neural circuits) become structurally and biochemically specialized during development and how a disruption of this process leads to neurological disorders. We use molecular, neuroanatomical, and physiological approaches to investigate neuronal development and dynamics under normal and pathological conditions, both in animal models and in human tissue. Supported by National Institute of Health, we are developing the first transgenic gerbil model for Fragile X syndrome.

## How I Can Help Collaborators

- Neuroanatomy
- Cellular and molecular analyses
- Confocal and multi-photon microscopy
- Animals models for neurological disorders
- Time-lapse Imaging

## How Collaborators Can Help

- Access to populations/dataset
- Computational modeling
- Machine/Deep learning approaches
- Advanced statistic analyses
- Human sensory functional analyses

## Additional Content
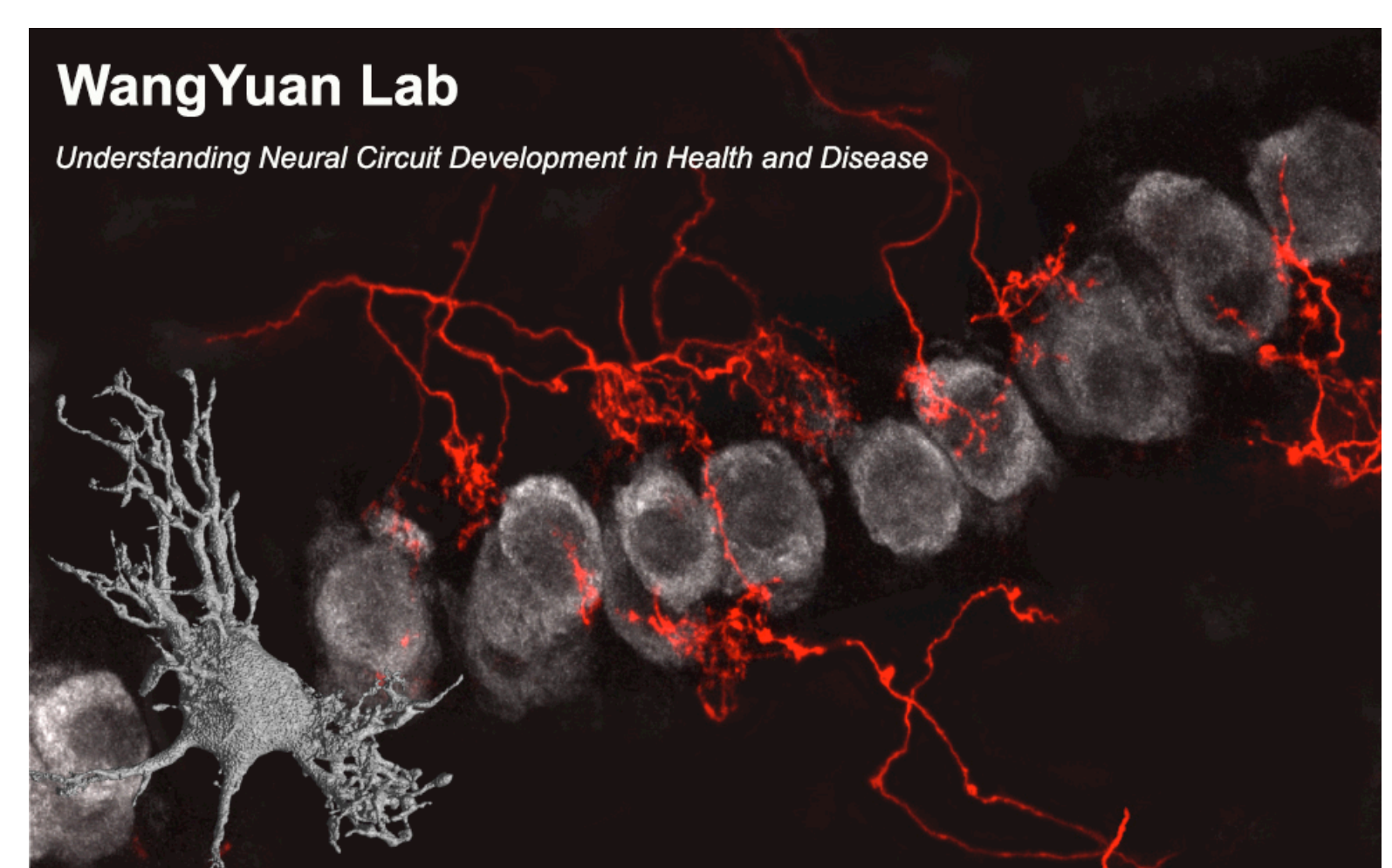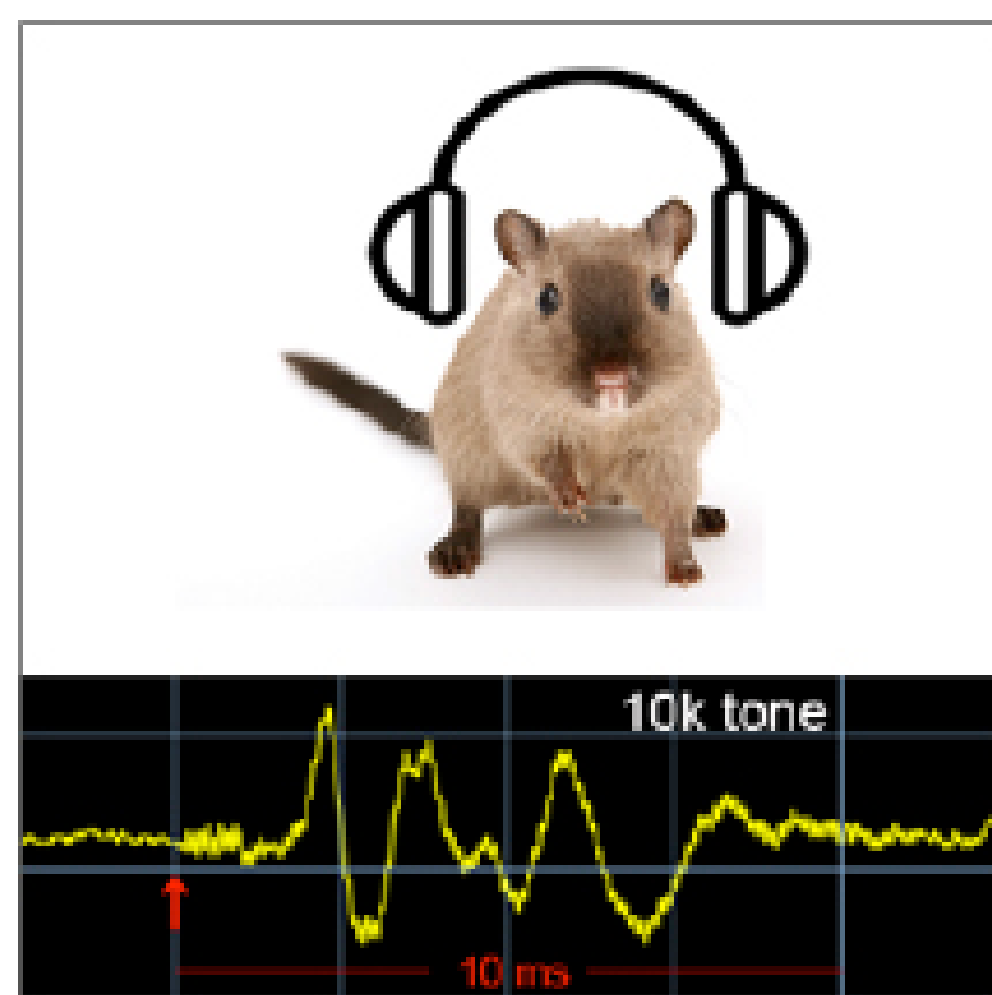




Lab website: https://med.fsu.edu/wangyuanlab/home

# Yue Julia Wang

Department of Biomedical Sciences
FSU College of Medicine
julia.wang@med.fsu.edu

Research Interests
- Molecular mechanisms of diabetes
- Single-cell RNA-seq
- Genomic data integration

## My Research Background

My long-term career goal is to understand the pathogenesis process of diabetes by combining high throughput, high content technologies and sophisticated bioinformatics analyses with targeted genetics approaches. My current research focus is to apply cutting-edge -omics approaches to understand the mechanism of human beta cell proliferation and to identify novel therapeutic targets for beta cell regeneration therapy in treating diabetes.

## How I Can Help Collaborators

- Genomics study design
- Single-cell RNA-seq data analysis
- Access to genomics datasets
- Building biological assays to validate targets

## How Collaborators Can Help

- In-depth multi-omic data integration
- Identifying genotype-phenotype correlation
- Developing novel statistical and bioinformatics approach and apply to single-cell data sets

## Additional Content

COLLABORATIVE COLLISION @FSU
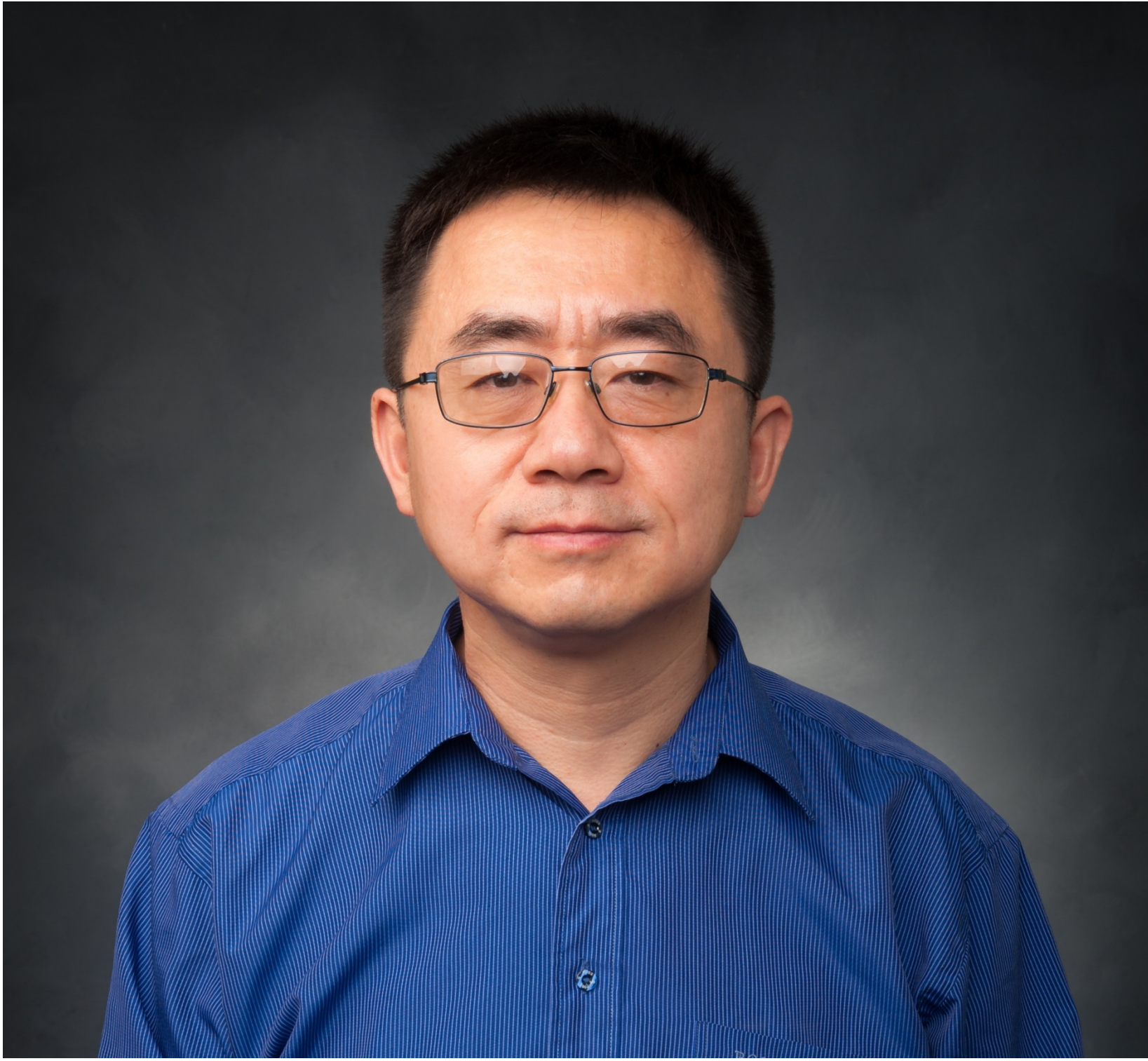
# Jinfeng Zhang

Department of Statistics
jinfeng@stat.fsu.edu

Research Interests

- Biomedical text mining and knowledge discovery
- Protein structure prediction and design
- Genomics data analysis

## My Research Background

My research interests include biomedical text mining and knowledge discovery, protein structure prediction and design, and genomics data analysis. We also study cancer using existing methods and the methods we develop in our research. Specifically, we are working on bio-entity relationship extraction and automatic knowledge discovery based on integrated bio-entity network using several different deep learning methods. We have developed a deep learning methods for protein design recently and are developing deep learning method for protein structure prediction. At the moment, we are developing deep learning methods for genomics data analysis such as single cell RNA-seq analysis.

## How I Can Help Collaborators

- Expertise in genomics data analysis
- Statistics
- Solving biomedical problems using statistical and computational methods.
- Differential nuclease sensitivity profiling of chromatin reveals biochemical footprints coupled to gene expression and functional DNA elements in maize. The Plant Cell, 2014, 26(10):3883-93.
- (2013) The spring-loaded genome: Nucleosome redistributions are widespread, transient, and DNA-directed. Genome Research.

## How Collaborators Can Help

- Testing our knowledge discovery engine
- Synthesize proteins we designed and measure their stability to validate our protein design method
- Knowledge in cancer field to work together on cancer research.

- Integrative comparison of mRNA expression patterns in breast cancers from Caucasian and Asian Americans with implications for precision medicine. Cancer Research, 2017; 77(2):423-433.

## Additional Content

S Zhang et. al.. MatchMixeR: A Cross-platform Normalization Method for Gene Expression Data Integration. Bioinformatics, In press.

Y Zhang et. al.. ProDCoNN: Protein Design Using a Convolutional Neural Network. Proteins, In press.

Y Zhang et. al.. FTIP: An Accurate and Efficient Method for Global Protein Surface Comparison. Bioinformatics, accepted.

Our new PubMed search engine: https://biokde.com

# Zhe He
*Assistant Professor*, School of Information
*Informatics Lead*, FSU-UF Clinical and Translational Science Award
Email: zhe@fsu.edu. Website: zhehe.info

**Research Interests**
- Biomedical and Health Informatics
- Artificial Intelligence in Medicine
- Big Data in Health

## My Research Background

My research lies in biomedical and health informatics, machine learning, clinical research informatics, knowledge representation, and data analytics. My overarching goal is to improve the population health and advance biomedical research through the collection, analysis, and application of electronic health data from heterogeneous sources. I received two Distinguished Paper Award from American Medical Informatics Association. My research has been funded by National Institutes of Health, Eli Lilly and Company, Amazon, NVIDIA, and Institute for Successful Longevity. I am the PI of an NIA R21 project on clinical trial generalizability assessment and a Co-I of an NIA R01 project on building an AI intervention for early detection of cognitive decline.

## How I Can Help Collaborators

- Data mining, machine learning, and predictive modeling
- Database management
- AI approaches for health-related problems
- Access to a large clinical data warehouse – OneFlorida Data Trust (longitudinal clinical data for over 20 million patients)
- Informatics approaches for grant proposals

## How Collaborators Can Help

- Collaboration in interdisciplinary projects on AI, big data, and machine learning
- Statistical modeling of complex datasets
- Longitudinal data analysis
- Implementation science
- Software development

## Additional Content

Current Grants:
1. The Adherence Promotion with Person-centered Technology (APPT) Project: Promoting Adherence to Enhance the Early Detection and Treatment of Cognitive Decline (NIA R01 2019 – 2024) PI: Walter Boot
2. Systematic Analysis of Clinical Study Generalizability Assessment Methods with Informatics (NIA R21 2019 - 2020) PI: Zhe He
3. Posttransplant Health Outcomes in Pediatrics Organ Transplantation (NCATS CTSA 2019 – 2010) MPI: Michael Killian and Zhe He