

## **Fulbright U.S. Scholar Program – Project Statement**

**Applicant:** Dr. Jianjun (JJ) Wang

**Proposed Host:** National Taiwan University – Institute of Health Data Analytics and Statistics

**Proposed Term:** Spring 2027

**Project Title:** Mapping the Invisible: Dimension Reduction for Social Network Analysis in Public Health Applications

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### **Project Summary**

This Fulbright project investigates the integration of dimension reduction techniques with social network analysis (SNA) to extract meaningful patterns from complex public health datasets. In collaboration with Professor Hung Hung at National Taiwan University, the study will explore advanced statistical learning methods to enhance the scalability and interpretability of SNA. By focusing on applied health analytics and interdisciplinary exchange, this work aims to strengthen methodological innovation and foster long-term collaborative ties between the U.S. and Taiwan.

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### **I. Introduction and Objectives**

This Fulbright project investigates how dimension reduction techniques can enhance the power and clarity of SNA in public health contexts. Specifically, I aim to identify scalable statistical strategies that simplify complex SNA data structures while preserving their relational information. Working in collaboration with Professor Hung Hung at National Taiwan University (NTU)—a leading scholar in dimension reduction analysis and robust statistical methods—this project will improve information extraction and develop SNA models that advance both theoretical understanding and practical utility in public health analytics.

### **II. Background and Rationale**

My research trajectory combines applied statistics, STEM education, and data science in support of equity-focused evaluation. I hold a Ph.D. in Science Education and passed the second Ph.D. Qualifying Examination in Statistics at Kansas State University (K-State). My statistical training was mentored by distinguished scholars including Professors Higgins, Johnson, and Neill—three past statistics department chairs at K-State. Notably, Dr. Dallas Johnson was a recipient of the Founder's Award from the American Statistical Association, the organization's highest honor.

My peer-reviewed publications span multiple areas of statistical application and appear in prestigious journals including *The American Statistician*, *Educational Researcher*, *Social Indicators Research*, *Journal of Nursing Measurement*, *Educational and Psychological Measurement*, *Evaluation and Program Planning*, *Ambulatory Surgery*, and *Journal of Social Service Research*.

More recently, I was inducted as a [2024 LASER Scholar](#) through NSF funding. Building on intensive training in social network analysis, I authored a [147-page grant report](#) that includes a comprehensive chapter (pp. 77–95) analyzing the network of child health programs.

My proposed Fulbright project builds directly on this foundation. While SNA has proven valuable for modeling relational dynamics in educational and public health systems, the complexity and high dimensionality of such data often limit interpretability and practical application. Dimension reduction offers a promising solution—clarifying patterns, enabling visualization, and improving the scalability of SNA for decision-making in public health.

### **III. Proposed Activities and Methodology**

During my Spring 2027 residency at NTU, I will undertake the following tasks:

**Literature Integration:** Conduct a systematic review of recent applications of dimension reduction methods (including PCA, t-SNE, UMAP, and factor analysis) in networked data structures, with particular emphasis on public health applications.

**Methodological Development:** Apply and rigorously compare these techniques across carefully selected public health-related SNA datasets to evaluate their effectiveness in preserving network structure while reducing complexity.

**Collaborative Research:** Co-develop innovative analytic pipelines in R and Python with NTU faculty and students, ensuring reproducibility and practical applicability.

**Knowledge Exchange:** Contribute to the academic community through lectures, colloquia, and seminars; provide mentoring opportunities for graduate students and early-career researchers.

**Publication and Dissemination Planning:** Develop a comprehensive plan for co-authored publications and explore opportunities for future joint research proposals.

### **IV. Benefits to the Host Institution**

My presence at NTU will contribute to the institute's interdisciplinary research in several ways:

**Knowledge Enrichment:** Bringing U.S.-based statistical modeling applications in education and public health, enriching the international dimensions of NTU's research portfolio.

**Cross-Cultural Methodological Innovation:** Introducing advanced methods in network analysis and visualization techniques that complement existing expertise at the institute.

**Capacity Building:** Sharing reproducible research tools and open-source strategies that support sustainable collaboration and enhance research infrastructure.

**Mentorship and Training:** Providing guidance to students and junior researchers in advanced statistical methods and international research collaboration.

### **V. Long-Term Collaboration Potential**

This project is strategically designed as a catalyst for sustained partnership between California State University, Bakersfield (CSUB) and NTU. As Faculty Ombudsman and Professor at CSUB, I am uniquely positioned to facilitate future institutional exchanges, co-sponsored workshops, and international student mentorship programs.

Anticipated long-term outcomes include:

- Joint publications in high-impact journals
- Collaborative proposals for international funding opportunities
- Student exchange programs and dual-degree initiatives
- Annual workshops on applied statistics in public health
- Ongoing research partnerships in health data analytics

## **VI. Cultural Exchange and Broader Impacts**

My academic journey began in China and has evolved through three decades of teaching, research, and mentoring in the United States. I view this Fulbright opportunity as a platform for rich cultural and intellectual exchange that honors both my heritage and my adopted home.

At NTU, I hope to share perspectives on institutional equity, data-driven decision-making, and inclusive research practices, while learning from Taiwan's innovative approaches to public health, education systems, and research culture. This cross-cultural dialogue will enhance my understanding of how statistical methods can be adapted to different cultural contexts.

I plan to bring these experiences back to CSUB through seminars, enhanced mentoring programs, and presentations to strengthen our institution's global perspective.

## **VII. Conclusion**

This project aligns strongly with the Fulbright Program's core mission of promoting mutual understanding, collaborative innovation, and research with public relevance. By exploring the intersection of dimension reduction and social network analysis within Taiwan's dynamic academic environment, I aim to contribute meaningfully to methodological advancement while fostering enduring cross-cultural partnerships.

The collaboration with Professor Hung and the broader NTU community represents an opportunity to advance both statistical methodology and public health applications while building bridges between American and Taiwanese research communities. Through this work, I hope to demonstrate how international collaboration can enhance scientific discovery and create lasting benefits for both participating institutions and the broader global research community.