Kristina P. **Sinaga**

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Summary

I earned my PhD in Applied Mathematics, in June 2020. I am very passionate about developing intelligent pattern recognition algorithms, especially for single and multi-view learning. I have a proven track record of success in this area and am proficient in various machine learning techniques, including classification, feature selection/reduction, parameter estimation, regression, and clustering. To test my proposed algorithms on large dataset, mostly I used programming tools like Matlab, Python, and R.

Doctoral Research

My PhD research revolved around single-view learning, multi-view learning, feature reduction, and collaborative fuzzy c-means discovery algorithms. In my dissertation, I investigated the structures between feature views in multi-view scenarios to better understand the structure-property-relationship processing of multi-view data. More specifically, I am interested in how single or multiple feature elements can be com- bined in retrieval, recognition, and reasoning tasks performed by intelligent system of k-means and fuzzy C-mean clustering.

Work Experience

Chung Yuan Christian University

Taoyuan, Taiwan

Post-Doctorate Fellow

March 2023 - July 2023

- Develop novel algorithms for clustering or tensor-based clustering that can be applied to large, complex data sets (Multi-view data).

Bina Nusantara University, Indonesia

Jakarta, Indonesia

Lecturer

November 2020 - May 2022

- My responsibilities include developing course materials and curriculum, stimulating meaningful discussions, attending conferences, conferring with other researchers and professionals, guiding/teaching undergraduate and graduate students, grading assignments, and serving as a member of the University.

Chung Yuan Christian University, Taiwan

Taoyuan, Taiwan

PhD Researcher

September 2016 - August 2020

- My main task as a PhD researcher was to conduct research to produce new knowledge, applications or insights at the cutting edge of the discipline and to adapt the research plan in light of unexpected problems. In detail, my PhD research revolved around single-view learning, multi- view learning, feature reduction, and collaborative fuzzy c-means discovery algorithms. It is worth mentioning that I developed a novel ma- chine learning architecture that simultaneously distinguishes the relevancy of one feature both in local and global steps without hurting the performance. Moreover, it also made it possible to update the affinity matrix of variables by measuring the agreement/disagreement terms across views (applies single-view learning algorithms directly) in multi- view data. By selecting the most important elements in the view, we were able to reduce the size of the elements by adjusting the thresholds. The new approach was also developed as a general extension of k-means to find the optimal number of clusters. Furthermore, the new design has been successfully applied to various available/public/open dataset without initialization and automatic retrieval of cluster numbers using the concept of entropy (proportion of one data point belonged to one class and the feature weight).

Education

CYCU (Chung Yuan Christian University)

Taoyuan, Taiwan

Ph.D. in Applied Mathematics

Sept. 2016 - Jun. 2020

- Thesis title: Multi-View Fuzzy Clustering Algorithms for Multi-View Data
- Advisor: Prof. Miin-Shen Yang
- CGPA: 3.842

USU (University of Sumatera Utara)

Medan, Indonesia

MS. in Mathematics

Dec. 2013 - Dec 2015

- Thesis title: Model Optimasi Stokastik Penentuan Lokasi dan Jumlah Ambulan dengan Korelasi (in Bahasa Indonesia)
- CGPA: 3.78
- Advisors: Prof. Herman Mawengkang and Dr. Esther Nababan

USU (University of Sumatera Utara) *Medan, Indonesia*

B.S. in Mathematics *Aug. 2011 - Aug. 2013*

- Thesis title: Analisis Pengaruh Produk Domestik Regional Bruto, Pendidikan dan Pengangguran terhadap Kemiskinan di Kabupaten/Kota Propinsi Sumatera Utara (in Bahasa Indonesia)
- CGPA: 3.30
- Advisors: Prof. Tulus and Dr. Open Darnius

Honors & Awards

International

2020	**Honorary member,** The Phi Tau Phi Scholastic Honor Society of The Republic of China	*CYCU, Taiwan*
2019	**Recipient,** MOST Travel Grant	*Taipei, Taiwan*
2018	**Recipient,** Japan Science and Technology Agency (JST)	*Niigata, Japan*
2017	**Recipient,** Japan Student Service Organization (JASSO)	*Niigata, Japan*
2016	**Recipient,** CYCU International Student Scholarship	*CYCU, Taiwan*

Certifications

2022	**Coursera-DeepLearning.AI TensorFlow Developer Professional,** Instructor: Laurence Moroney	*Online Courses*
2022	**Coursera-Machine Learning Specialization,** Instructor: Andrew Ng	*Online Courses*
2020	**Coursera-Learning to Teach Online,** Instructor: Associate Professor Simon McIntyre & Dr Negin Mirriah	*Online Courses*

Professional Service

Reviewer	**IEEE Access,** Journal Details: click here	*2020 - Present*
Reviewer	**IEEE TKDE,** Journal Details: click here	*2021 - Present*
Reviewer	**Information Fusion (Elsevier),** Journal Details: click here	*2021 - Present*
Reviewer	**Applied Soft Computing (Elsevier),** Journal Details: click here	*2021 - Present*
Reviewer	**IJCNN2023,** Conference Details: click here	*2023*
Reviewer	**WCCI2022,** Conference Details: /click here	*2022*

Teaching

International

2020-2022	**Graduate Program,** Business Intelligence and Analytics	*Jakarta, Indonesia*
2020-2022	**Undergraduate Program,** Discrete Mathematics	*Jakarta, Indonesia*
2020-2022	**Undergraduate Program,** Calculus I	*Jakarta, Indonesia*

Skills

Goal Oriented

- I believe in action over long-winded discussions. I listen to everyone’ s viewpoints and use my judgement to immediately act based on consensus to achieve goals quickly and efficiently.

Pattern Recognition

- Developing and designing unsupervised clustering algorithms within single and multi-view data (e.g. the k-means, fuzzy c-means, feature reduction) have contributed to an advancement of pattern recognition systems.

Passionate

- I have been interested in Mathematics and programming when I was pursuing my PhD. It was during this period that I realized that I found a great interest on these topics of research because it puts together some of my favorite topics: data analysis, multi-view learning, clustering, image recognition, feature selection, feature reduction, k-means, fuzzy c-means, collaborative learning, and algorithms. My education and research have cemented this interest into a passion. I greatly enjoy carrying out Multi-view learning, machine learning, and deep learning research with potential practical applications. I deeply interested in learning and implementing multidisciplinary approaches to complex questions.

References

[1] Sinaga, Kristina P. ; Yang, Miin-Shen: Unsupervised K-means clustering algorithm. In: *IEEE access* 8 (2020), S. 80716–80727

[2] Yang, Miin-Shen ; Sinaga, Kristina P.: A feature-reduction multi-view k-means clustering algorithm. In: *IEEE Access* 7 (2019), S. 114472–114486

[3] Yang, Miin-Shen ; Sinaga, Kristina P.: Collaborative feature-weighted multi-view fuzzy c-means clustering. In: *Pattern Recognition* 119 (2021), S. 108064

[4] Sinaga, Kristina P. ; Hussain, Ishtiaq ; Yang, Miin-Shen: Entropy K-means clustering with feature reduction under unknown number of clusters. In: *IEEE Access* 9 (2021), S. 67736–67751

[5] Sinaga, Kristina P.: Poverty Data Modeling in North Sumatera Province Using Geographically Weighted Regression (GWR) Method. In: *International Journal of Science and Research* 4 (2015), Nr. 2, S. 1738–1742

[6] Sinaga, Kristina P. ; Hsieh, June-Nan ; Benjamin, Josephine B. ; Yang, Miin-Shen: Modified relational mountain clustering method. In: *Artificial Intelligence and Soft Computing: 17th International Conference, ICAISC 2018, Zakopane, Poland, June 3-7, 2018, Proceedings, Part I 17* Springer, 2018, S. 690–701

[7] Alexandra, Jennifer ; Sinaga, Kristina P.: Machine learning approaches for marketing campaign in portuguese banks. In: *2021 3rd International Conference on Cybernetics and Intelligent System (ICORIS)* IEEE, 2021, S. 1–6

[8] Sinaga, Kristina P. ; Hutahaean, Manuntun ; Gea, Petrus: Spatial Variation in Infant Mortality with Geographically Weighted Poisson Regression (GWPR) Approach. In: *vol* 5 (2016), Nr. 3, S. 96–100

[9] Yuniati, Dyah ; Sinaga, Kristina P.: Analytics-Based on Classification and Clustering Methods for Local Community Empowerment in Indonesia. In: *Soft Computing in Data Science: 6th International Conference, SCDS 2021, Virtual Event, November 2–3, 2021, Proceedings 6* Springer, 2021, S. 133–145

[10] Wibowo, Henwy ; Sinaga, Kristina P.: Telecommunication Analytics Based on Customer Segmentation Using Unsupervised Algorithms. In: *2021 3rd International Conference on Cybernetics and Intelligent System (ICORIS)* IEEE, 2021, S. 1–6

Referee

Available on request.