Density peak clustering evaluation

Viet-Vu Vu[1], Byeongnam Yoon[2], Dinh-Lam Pham[1,2], Hong-Quan Do[3], Hai-Minh Nguyen[4], Tran-Chung Dao[4], Thi-Hai-Yen Nguyen[5], Doan-Vinh Tran[6], Thi-Huong-Ly Nguyen[7], Viet-Thang Vu[8]

[1]VNU Information Technology Institute, Vietnam National University, Hanoi, Vietnam
[2]Contents Convergence Software Research Institute, Kyonggi University, South Korea
[3]FPT University, Hanoi, Vietnam
[4]ICTU – University of Information and Communication Technology, Thai Nguyen University, Vietnam
[5]Hanoi Procuratorate University, Hanoi, Vietnam
[6]University of Education, Vietnam National University, Hanoi, Vietnam
[7]Nha Trang University
[8]Hanoi University of Industry

Correspondence: Viet-Vu Vu (vuvietvu@vnu.edu.vn)

Abstract—**Density based clustering is one of the most tools used in clustering data analysis because of it can detect cluster with arbitrary shapes and noises. Some methods have been proposed in literature such as DBSCAN and density peak clustering. In density peak clustering (DPC), the results may directly depend on the method used in density estimation. In this paper, we conduct some experimentations with various data set to observe and analysis the results obtained by DPC when using some kinds of density estimation.**

Keyword—**Density based clustering, density peak clustering, density estimation**

Assoc. Prof. **Dr. Viet-Vu** Vu received the B.S. degree in Computer Science from Hanoi University of Education in 2000, a M.S. degree in Computer Science from Hanoi University of Technology in 2004, and a Doctor Degree in Computer Science from Paris 6 University in 2011. He is a researcher at Information Technology Institute, Vietnam National University, Hanoi. His research interests include clustering, active learning, semi-supervised clustering, and E-government applications

Byeongnam Yoon (M'97) He became a Member of IEEE in 1997. He was born in Seoul Korea 1949. He got the PhD in computer science, Chungnam National University, Korea, 1997. He worked for the Sperryrand UNIVAC as a Computer Specialist 1974 -1978, Samsung as a Manager of Telecommunications Section 1978 - 1982, Electronics& Telecommunications Research Institute (ETRI) as a Principal Researcher 1982 – 1999, National Information society Agency (NIA) as a Senior Executive Director General 1999 – 2010, Kyonggi University (KGU) as an Associate Professor, Faculty of Computer Science 2010 - 2016. He is an invited professor at Information Technology Institute, Vietnam National University, Hanoi Vietnam since 2017, and Global IT Research Institute GIRI) as a President 1999 – current. His research areas include Telecommunications, Internet, Software, Web programming & security, e-Government, Enterprise Architecture, Work Flow, BPM. System Work Method. SPiC, CMMI, etc.

Dinh-Lam Pham is a research professor in the Contents Convergence Software Research Institute at Kyonggi University, South Korea. He received B.S. degree and M.S. degree in computer science from Thai Nguyen University in 2008 and 2010, respectively, and received Ph.D. degree in Computer Science from Kyonggi University in 2021. His research interests include video retrieving system, deep learning, workflow systems, BPM, workflow-supported social and affiliation networks discovery and analysis, process mining, deep-learning-based process predicting.

MSc. **Hong-Quan Do** received a double M.S. degree in Information and Communication Technology from University of Science and Technology of Hanoi, Vietnam and The University of Rennes 1, France in 2015. He is a lecturer at FPT University, Hanoi, Vietnam. His research concentrates primarily on Clustering, Semi-supervised Clustering, Image processing and Recommender Systems. At the present, he has also been involved in some E-Government projects, and E-Commerce Recommendation applications.

Dr. **Nguyen Hai Minh** received a PhD degree in Computer science and Engineering from Kyungpook National University, Korea in 2014. He is a dean of Faculty of Information Technology - ICTU. His study focuses on Health Informatics, Health IT Standards and Medical Image Processing

M.IT **Tran-Chung Dao** received a M.IT degree in Information Technology from Manuel S. Enverga University Foundation, Philippines 2013. He is a lecturer at Thai Nguyen University Information and communication technology, Thai Nguyen, Viet Nam. His research concentrates primarily on Clustering and Image processing.

Thi-Hai-Yen Nguyen is now a lecturer of Hanoi Procuratorate University, Hanoi, Vietnam. Her interest topic is machine learìng and information retrieval.

Associate Professor, Dr. **Doan-Vinh Tran** received a PhD degree in Informatics Education from the Russian Academy of Educational Sciences, Russia in 1997. Now, he is a lecturer at the Faculty of Educational Technology, University of Education, Vietnam National University, Hanoi. His research concentrates primarily on Informatics Education, Digital Education, applications VR/AR/MR/XR in Digital Education, Clustering and Image processing.

Thi-Huong-Ly Nguyen received her MS degree in information technology from Nha Trang University in 2019. Since 2019, she has been with the Faculty of Information Technology at Nha Trang University, Vietnam, where she is now a lecturer. Her main research interests are machine learning, data analysis, and data science.

Dr. **Viet-Thang Vu** received the B.S. degree in Information Technology from Mendeleev University of Chemical Technology of Russia, 2008, a M.S. degree in Information Technology, Le Quy Don University, VietNam, 2012, and a Doctor Degree in Computer Science, Moscow Institute of Physics and Technology (MIPT), Russia, 2019. He is a head of division information system at Hanoi University of Industry, Vietnam. His research interests include cyber-security, image processing and computer vision, machine learning, data mining.