MINISTRY OF INDUSTRY AND TRADE
ELECTRIC POWER UNIVERSITY

SOCIALIST REPUBLIC OF VIET NAM
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INFORMATION ON NEW CONCLUSIONS OF DOCTORAL DISSERTATION
(Information will be posted on the Website)

Name of dissertation: Research on Improving Manifold Ranking Algorithms in Content Based Image Retrieval
Major: Information Technology   Code No: 9480201
Name of PhD. Student: Hoang Van Quy
Advisors: 1. Dr. Ngo Hoang Huy.
                            2. Dr Nguyen The Cuong.
Training Institution: Electric Power University

Summary of new contributions of the Dissertation

Contribution 1: Improving the EMR algorithm by using the lvdc-FCM fuzzy clustering algorithm to identify anchor points:

+Proposing enhancements to the estimation of cluster centers and membership matrix in fuzzy clustering algorithms.

+Proposing the EMR-(lvdc-FCM) algorithm to enhance the original EMR (or EMR-K-means) algorithm applied to Content-Based Image Retrieval (CBIR).

Contribution 2: Improving image retrieval effectiveness by combining low-level and high-level features extracted from CNNs:

 + Proposing a method to fine-tune CNNs for feature extraction prior to combining with low-level features.

+ Proposing the HD-EMR algorithm based on anchor points estimated by the improved FCM and ANN (LDM-FCM algorithm) for image retrieval without dimensionality reduction. Proposing the use of GPU architecture for efficient implementation of the LDM-FCM clustering algorithm.

Additionally, the thesis introduces new theoretical foundations and techniques in CBIR: Presenting a new proposition regarding the generality of data manifold on finite vector sets, providing theoretical foundations for the application of manifold ranking in CBIR.

Hanoi, 12 November 2023

Advisors 1	**Advisors 2**	**PhD. Student** *(Signature)*
Dr. Ngo Hoang Huy	**Dr. Nguyen The Cuong**	**Hoang Van Quy**