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جامعة قسنطينة 1 – الإخوة منتوري
كليـــــــــة العلوم الد قيـقة

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MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Constantine 1 University – Frères Mentouri
Faculty of Exact Sciences

ANNONCE DE SOUTENANCE

Conformément à la décision n° **52/D3C/2026** du **04 MAI 2026** autorisant la soutenance d'une thèse de doctorat, le Vice-doyennat chargé de la post-graduation, de la recherche scientifique et des relations extérieures, a n n o n c e la soutenance publique d'une thèse de doctorat le :

Mercredi 13 MAI 2026 à 16 HOO

Lieu : Salle de conférences sise au Campus Ahmed HAMANI (ZERZARA)
Constantine 1 Frères Mentouri.

F i l i è r e : MATHEMATIQUES
Spécialité : Statistique Appliquée

Doctorante : MEKKI Soundes

Sur le thème : « Clustering and Pattern recognition using neural methods : Theory and applications ».

Devant le jury d'examen :

	Nom et prénoms	Grade	Etablissement d'appartenance
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Abstract

This research examines neural-based approaches for improving clustering and pattern recognition in complex, high-dimensional datasets. The central objective is to show how neural architectures generate informative latent representations that enhance the performance and interpretability of unsupervised learning.

The study First reviews traditional clustering techniques such as K-Means and DBSCAN,
emphasizing their limitations when facing non-linear, noisy, or irregular data structures. To address these challenges, several neural feature extraction models are investigated_Self-Organizing Maps, Restricted Boltzmann Machines, Variational Auto encoders, and Bidirectional Generative Adversarial Networks. Each model is evaluated for its capacity to learn compact, structured manifolds that preserve essential data relationships.

The study evaluates the combination of neural latent representations with clustering algorithms on MNIST, Fashion-MNIST, and UCI HAR datasets using standard validation metrics. Results show that generative and probabilistic models, particularly VAE and BiGAN, produce more discriminative latent spaces and significantly improve clustering quality. Hybrid variational adversarial approaches further enhance robustness and generalization, especially for biomedical and sensor data. The work emphasizes the key role of latent space structure in clustering performance, connects classical statistical learning with deep models, and suggests future research in hybrid architectures, density-based clustering, and medical and anomaly detection applications.