Project Name	*Convexity regularizer for neural optimal transport*
Project Type	*Replication/Research*
Team Name	*Bin-Koff*
Project Team	*(List of members (3-5) with brief description of qualifications)* Bintang A.S.W.A.M - *moderate theoretical knowledge in convex optimization and deep learning tools and newbie in Optimal Transport* *Koffivi Gbagbe - Moderate knowledge in Deep learning and newbie in Optimal Transport*
Who suggested	Nikita Gushchin (TA)
Difficulty	*Hard* *(Difficulty listed in the project table (for TA's projects) or your own difficulty assessment for project suggested by you)*
Proposal	*Using neural networks to solve continuous optimal transport problem is a promising approach especially for unpaired style-transfer problem. This method learns a one-to-one mapping (OT map) between the source and target data distributions but uses adversarial training (similar to GANs), which is not very stable. Unlike GANs, this method's optimal "discriminator" must be convex, and its gradient can be used for inverse mapping from the target distribution to the source distribution. To address the issue of stability, it's necessary to insert a convexity regularizer (kind of gradient penalty in WGAN-GP) in the loss of neural optimal transport to improve its stability during optimal transport training while preserving the high-quality of the inverse target-to-input mapping.* *keywords: OT map, inverse target-to-input mapping, adversarial training, convex optimal transport, convexity regularizer, WGAN-GP*
Specific Tasks & Expected results	➢ 1. Get familiar with the neural optimal transport article (https://openreview.net/forum?id=d8CBRlWNkqH) and code. ➢ 2. Choose one or several datasets for experiments. ➢ 3. Add a convexity regularizer to the neural optimal transport algorithm and train the model. ➢ 4. Research how the stability of training and quality of the inverse mapping increases.
Relevant papers	➢ https://openreview.net/forum?id=d8CBRlWNkqH ➢ https://arxiv.org/abs/1903.03850v1
Grading Scheme	90% - do all from the **Specific Tasks & Expected results** and prove that stability of training and quality of the inverse mapping increases. 70% - do all from the **Specific Tasks & Expected results** and obtain results comparable with the neural optimal transport paper on any dataset.