

# Adversarially Constrained Autoencoder Interpolations using Wasserstein Autoencoder

Machine Learning

Lorenzo Palloni

University of Florence

*lorenzo.palloni@stud.unifi.it*

April 16, 2020

- **Unsupervised Learning** context
- we aim to obtain "high-quality" **interpolations**
- interpolations example:

ooo INSERT AN IMAGE HERE ooo

# Motivation

- uncover underlying structure of dataset
- better representations  $\rightarrow$  better results in other tasks

- An "high-quality" interpolation point have two characteristics:
  - is indistinguishable from real data
  - represent a semantically smooth morphing between the endpoints

# Techniques implemented (using pytorch)

- ACAI (Adversarially Constrained Autoencoder Interpolations)
- WAE (Wasserstein Autoencoder)
- WWAE (Wasserstein-Wassertein Autoencoder)









# Results on MNIST

# Problems encountered

# Other applications

# Conclusion

# Appendix - Wasserstein distance

# Appendix - Maximum Mean Discrepancy




# Appendix - Inverse Multiquadratic kernel

## Appendix - Frechét distance between two Multinormals



- **Entity Embedding** is an useful technique to put into your **toolbox**;
- in some situations can lead to a **crucial** saving in computational resources.

# References

-  Guo, C., & Berkhahn, F. (2016). Entity embeddings of categorical variables. arXiv preprint arXiv:1604.06737.
-  Kingma, D. P., & Ba, J. (2014). Adam: A method for stochastic optimization. arXiv preprint arXiv:1412.6980.
-  Abadi, M., Barham, P., Chen, J., Chen, Z., Davis, A., Dean, J., ... & Kudlur, M. (2016). Tensorflow: A system for large-scale machine learning. In 12th USENIX Symposium on Operating Systems Design and Implementation (OSDI 16) (pp. 265-283).