

# Progress Report

Simon Sepiol-Duchemin

July 23, 2025

## 1 Research Objective and Goal

The objective of this study is to improve the booleanization part of algorithm from Truong et al. (2021). Starting with understanding the nonnegative matrix factorization problem and algorithms to solve it.

## 2 Short-Term Goals

1. Try to parallelize the Cardano algorithm and try to find the best parametres for it.

## 3 Progress

1. I did not succesfully parallelize the algorithm.
2. The best parametres remains not so good compared to banmf.

## 4 Results

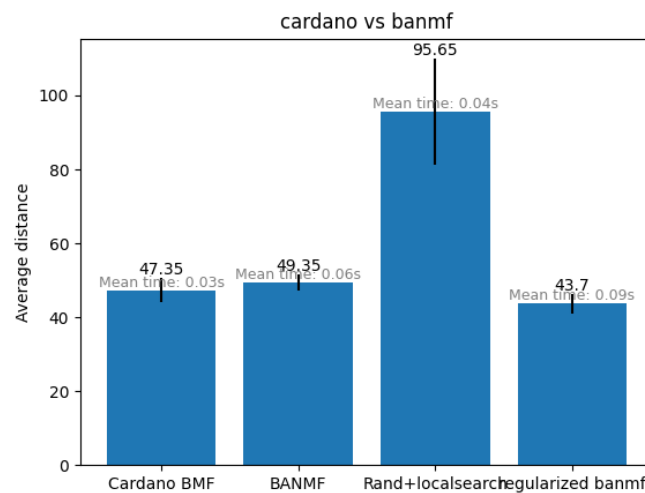


Figure 1: Algorithms comparison (all with local search)

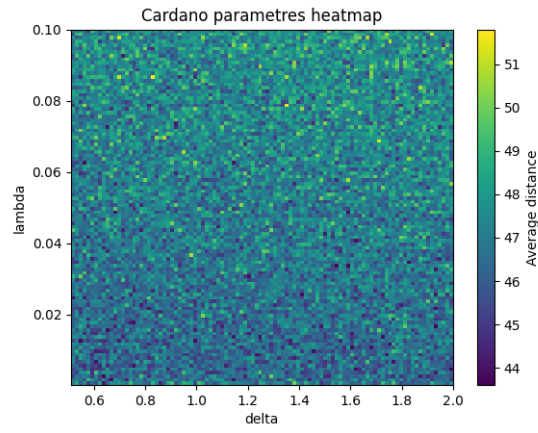


Figure 2: Cardano parameters heatmap

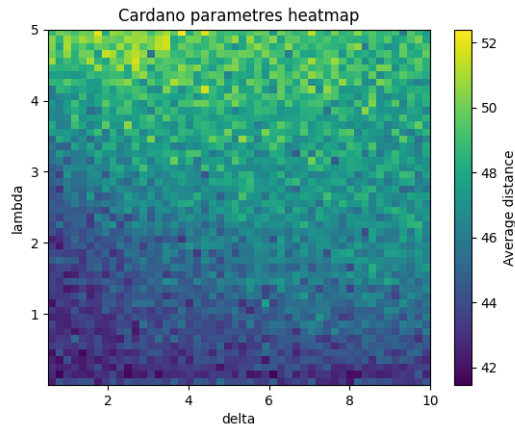


Figure 3: Cardano parameters heatmap

## References

Truong, D. P., Skau, E., Desantis, D., and Alexandrov, B. (2021). Boolean matrix factorization via nonnegative auxiliary optimization. *IEEE Access*, 9:117169–117177.