Project proposal

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(i) - Chosen topic

Topic I - Learning to Solve Algebraic Equations

(ii) - Plan

- Read through papers [1] and [3], make sure we understand the main ideas.
- Replicate results from [1] using implementation [2] :
    - Extend [2] with [1], in pytorch.
    - Experiences: Arithmetic dataset ; Product of sequential MNIST : compare NMU vs NALU ; maybe “Language to numbers translation”
- We propose to work on different things because the proposed work for finding the determinant, especially the end, is not clear to us as of now.
    - Concerning the potential work on the discriminant, the general formula with the adjugate matrices only reduces the size of the determinant to be computed by 1. If the matrix has a special structure such as block-diagonal or triangular then its determinant could indeed be decomposed as the product of smaller determinants. We don’t recall the proposed steps of learning to find the determinant.
    - Propose a unifying strategy between the NAU and the NMU of [3], like the sigmoid gating of [1].
    - Study the integration of those blocks into RNN cells, and evaluate the performance of such networks on classical future prediction tasks.
    - Study the integration of these blocks into a RL framework, going deeper than NALU’s “Learning to track time”.

[1] Natural arithmetic units, https://openreview.net/pdf?id=H1gNOeHKPS
[2] https://github.com/AndreasMadsen/stable-nalu
[3] Trask, A., Hill, F., Reed, S., Rae, J., Dyer, C., & Blunsom, P. (2018). Neural arithmetic logic units. *Advances in Neural Information Processing Systems*, *2018-Decem*, 8035–8044.

(iii) - Members

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