Vision Transformer Architectures with Registers (Thesis outline)

Florian Weidner
Philipps-University Marburg, Germany
Department of Mathematics and Computer Science, Deep Learning Group
February 09, 2024

I. PRELIMINARY STRUCTURE

- 1) Abstract
- 2) Introduction
- 3) Vision Transformer (ViT) need Registers
- 4) Comparison to papers with performance improvements of ViTs
- 5) Conclusion

Abstract—The abstract goes here.

II. INTRODUCTION

Introduction to the topic... Explanation of ViTs [4] [2] [6] [5]

III. USING TRANSISTORS IN VITS NETWORKS Summerization and explanation of the paper [1] [9]

IV. COMPARISON TO PAPERS WITH PERFORMANCE IMPROVEMENTS OF VITS

survey: [3]

I thought of comparing the previous explained paper [1] with papers like [10] [11] [8] [7] [5] which try to improve efficiency of ViTs

V. CONCLUSION

The conclusion goes here.

REFERENCES

- [1] Timothée Darcet et al. *Vision Transformers Need Registers*. 2024. arXiv: 2309.16588 [cs.CV]. URL: https://arxiv.org/abs/2309.16588.
- [2] Alexey Dosovitskiy et al. An Image is Worth 16x16 Words: Transformers for Image Recognition at Scale. 2021. arXiv: 2010.11929 [cs.CV]. URL: https://arxiv.org/abs/2010.11929.
- [3] Quentin Fournier, Gaétan Marceau Caron, and Daniel Aloise. "A Practical Survey on Faster and Lighter Transformers". In: *ACM Comput. Surv.* 55.14s (July 2023). ISSN: 0360-0300. DOI: 10.1145/3586074. URL: https://doi.org/10.1145/3586074.
- [4] Salman Khan et al. "Transformers in Vision: A Survey". In: ACM Comput. Surv. 54.10s (Sept. 2022). ISSN: 0360-0300. DOI: 10.1145/3505244. URL: https://doi.org/10.1145/3505244.

- [5] Yun Liu et al. "Vision transformers with hierarchical attention". en. In: *Mach. Intell. Res.* 21.4 (2024), pp. 670–683.
- [6] Bo-Kai Ruan, Hong-Han Shuai, and Wen-Huang Cheng. *Vision Transformers: State of the Art and Research Challenges*. 2022. arXiv: 2207.03041 [cs.CV]. URL: https://arxiv.org/abs/2207.03041.
- [7] Michael S. Ryoo et al. *TokenLearner: What Can 8 Learned Tokens Do for Images and Videos?* 2022. arXiv: 2106.11297 [cs.CV]. URL: https://arxiv.org/abs/2106.11297.
- [8] Hugo Touvron, Matthieu Cord, and Hervé Jégou. "DeiT III: Revenge of the ViT". In: Computer Vision – ECCV 2022. Ed. by Shai Avidan et al. Cham: Springer Nature Switzerland, 2022, pp. 516–533. ISBN: 978-3-031-20053-3.
- [9] Feng Wang et al. Mamba-R: Vision Mamba ALSO Needs Registers. 2024. arXiv: 2405.14858 [cs.CV]. URL: https://arxiv.org/abs/2405.14858.
- [10] Yuxin Wen et al. Efficient Vision-Language Models by Summarizing Visual Tokens into Compact Registers. 2024. arXiv: 2410.14072 [cs.CV]. URL: https://arxiv.org/abs/2410.14072.
- [11] Hongxu Yin et al. "A-ViT: Adaptive Tokens for Efficient Vision Transformer". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2022, pp. 10809–10818.