KU LEUVEN

Nathan Cornille
Marie-Francine Moens
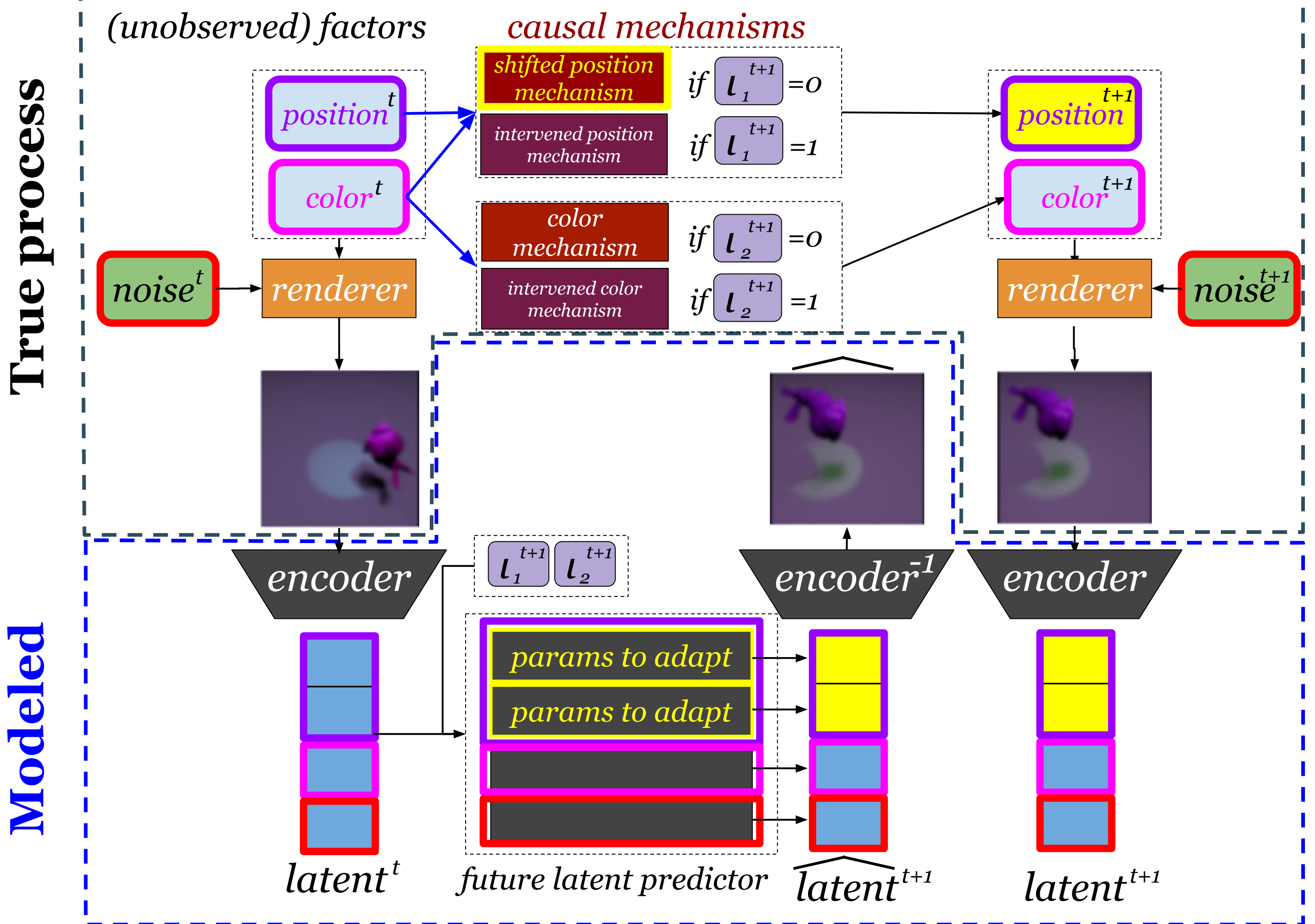Department of Computer Science
April 11 2023

Causal Mechanism Disentanglement to improve Few-Shot Domain Adaptation after a Sparse Mechanism Shift for Next Frame Prediction

Assuming that a distribution shift is due to a Sparse Mechanism Shift[1], we can minimize the expected number of parameters that need to update by disentangling parameters with regard to causal mechanisms. Updating only the corresponding parameters might then improve adaptation speed[2].

- Causal Factor Disentanglement using interventions (CITRIS[2])
- Causal Discovery to ensure parent-only dependence
- Sparse Parameter Update to prevent catastrophic forgetting

References

1. Schölkopf, Bernhard, Francesco Locatello, Stefan Bauer, Nan Rosemary Ke, Nal Kalchbrenner, Anirudh Goyal, and Yoshua Bengio. "Towards causal representation learning 2021." arXiv preprint arXiv:2102.11107 (2021).
2. Bengio, Yoshua, Tristan Deleu, Nasim Rahaman, Rosemary Ke, Sébastien Lachapelle, Olexa Bilaniuk, Anirudh Goyal, and Christopher Pal. "A meta-transfer objective for learning to disentangle causal mechanisms." arXiv preprint arXiv:1901.10912 (2019).
3. Lippe, Phillip, Sara Magliacane, Sindy Löwe, Yuki M. Asano, Taco Cohen, and Stratis Gavves. "Citris: Causal identifiability from temporal intervened sequences." In International Conference on Machine Learning, pp. 13557-13603. PMLR, 2022.