
Self-Supervised Exploration via Disagreement

Deepak Pathak^{*1} Dhiraj Gandhi^{*2} Abhinav Gupta²³

ICML 2019

Contents

- Self-supervised learning
- Methods
- Experiments

Self-supervised learning

- Supervised learning

$$\min_{\theta} \mathbb{E}[L_{dis}(f_{\theta}(x), y)]$$

- Unsupervised learning

$$\min_{\theta} \mathbb{E}[L_{gen}(f_{\theta}(x), x)]$$

- Self-supervised learning

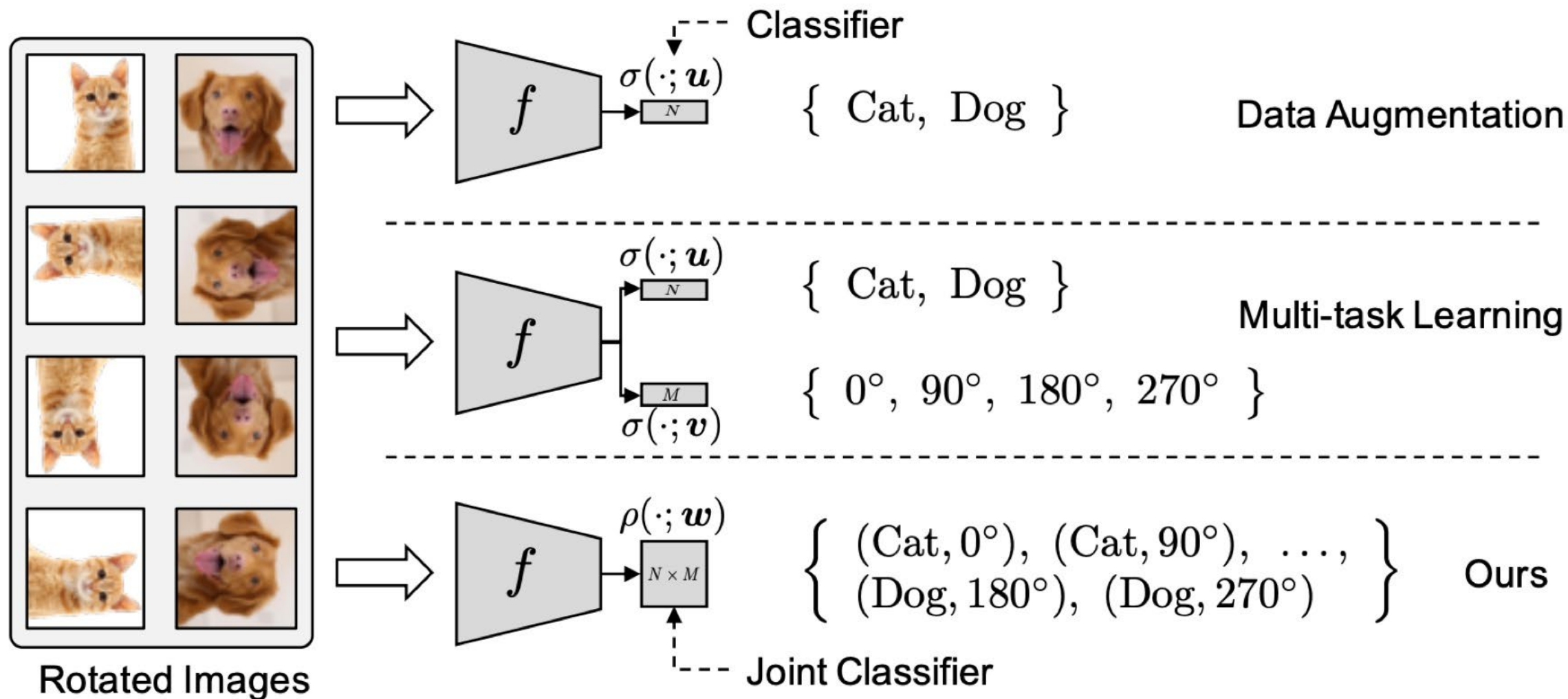
$$\min_{\theta} \mathbb{E}[L_{dis}(f_{\theta}(x), s(x))]$$

where $s(\cdot)$ is the surrogate annotation function that synthesizes the annotations from the data.

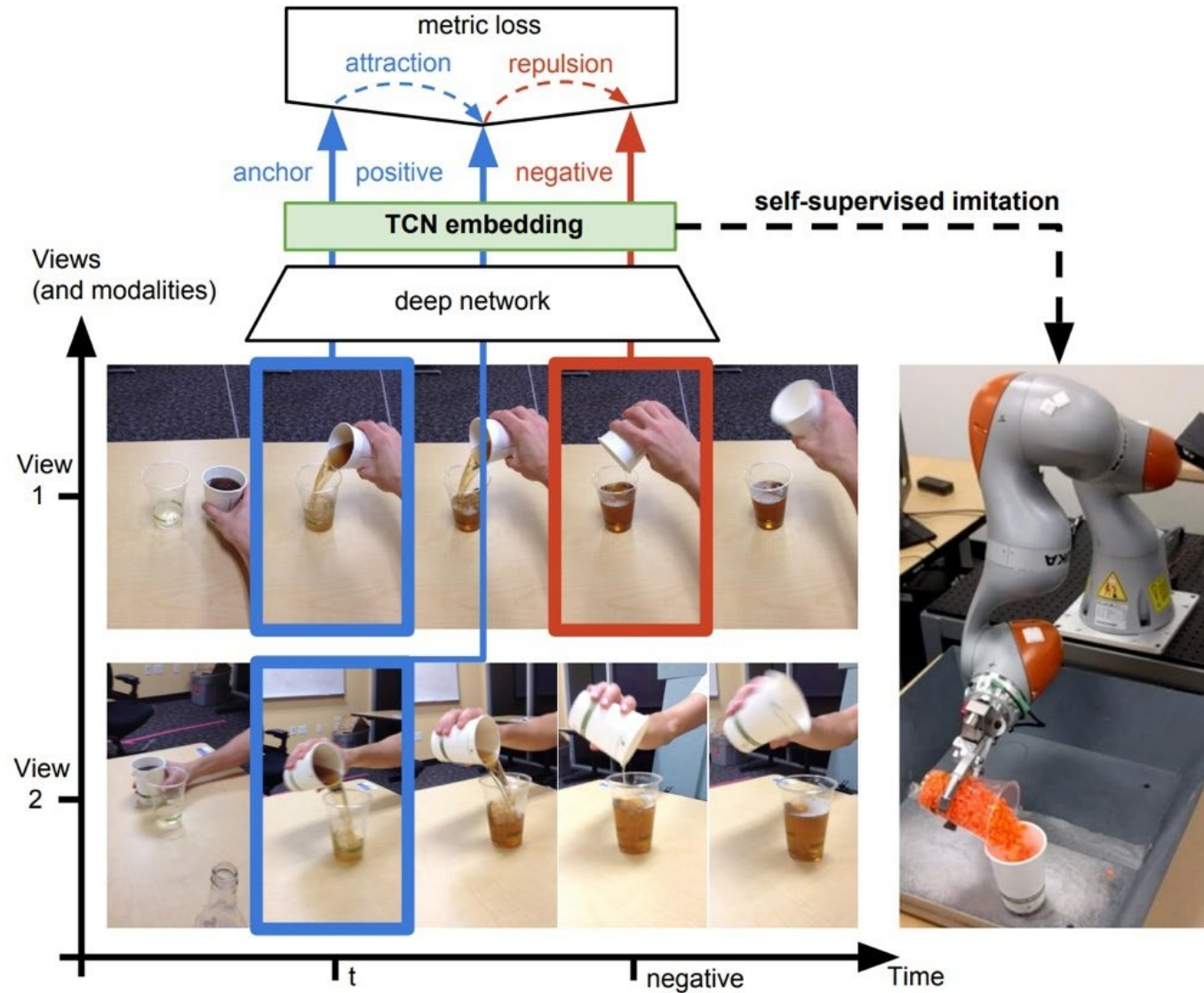
Self-supervised learning

- Context Based
- Temporal Based
- Contrastive Based

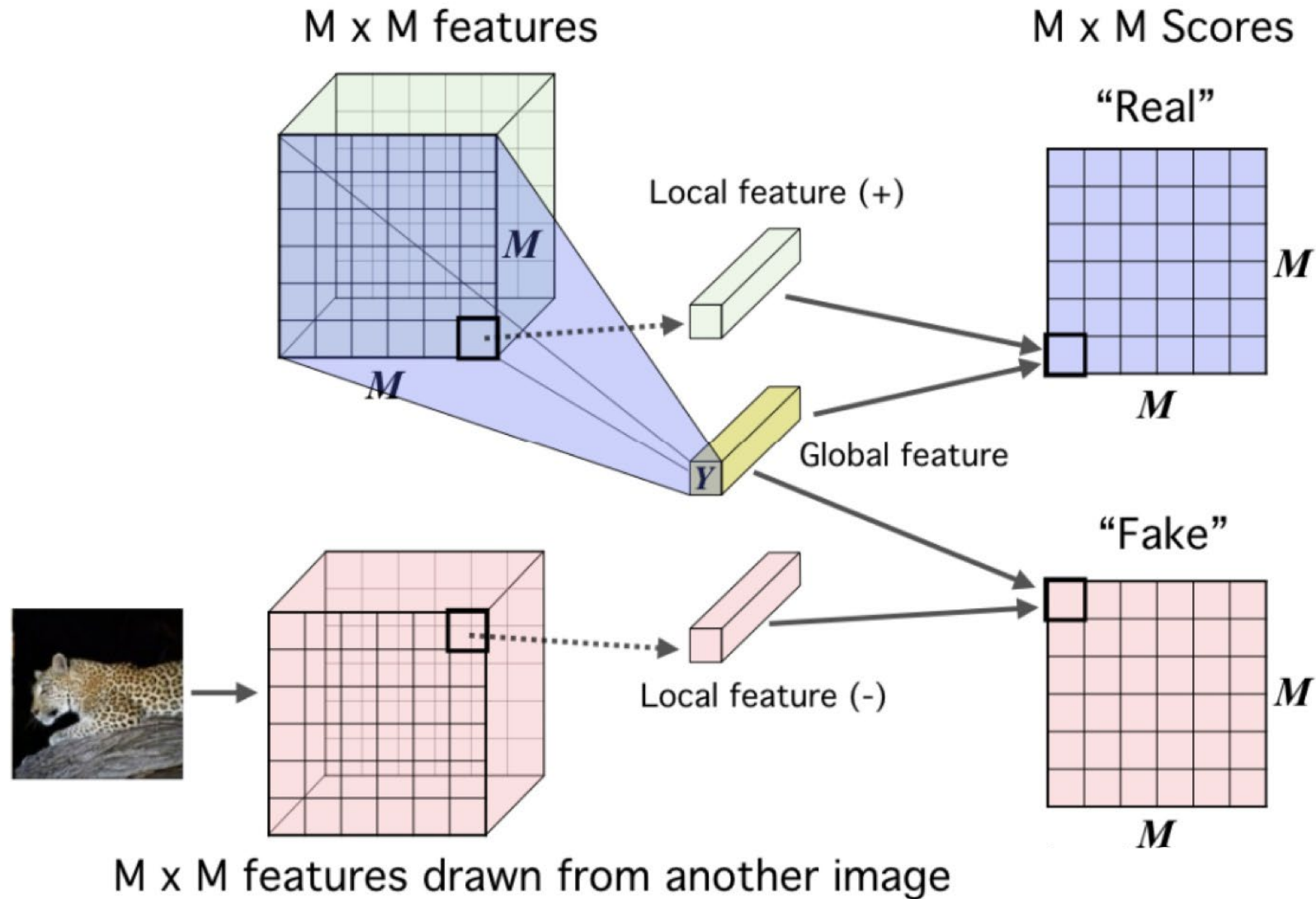
Self-supervised learning (Context Based)



Self-Supervised learning (Temporal Based)



Self-Supervised learning (Contrastive Based)



Methods

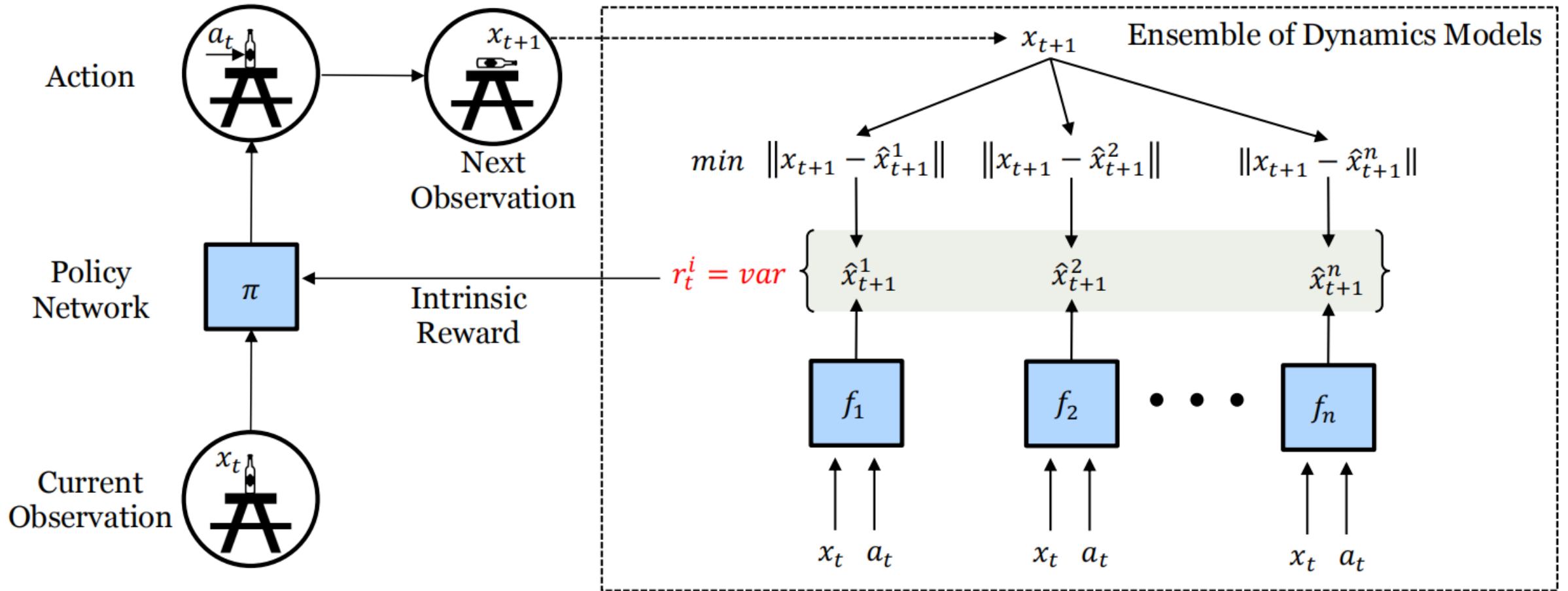
- A formulation for exploration is proposed which inspired by the work in active learning literature.
- The agent is allowed to learn skills by exploring in a self-supervised manner **without any external reward**.
- Curiosity-driven[1][2]

[1] Pathak, Agrawal, Efros, Darrell. Curiosity-driven Exploration by Self-supervised Prediction. In ICML 2017.

[2] Burda*, Edwards*, Pathak*, Storkey, Darrell, Efros. Large-Scale Study of Curiosity-Driven Learning. In ICLR 2019.

No game score... No goal... No rewards...
Only curiosity!

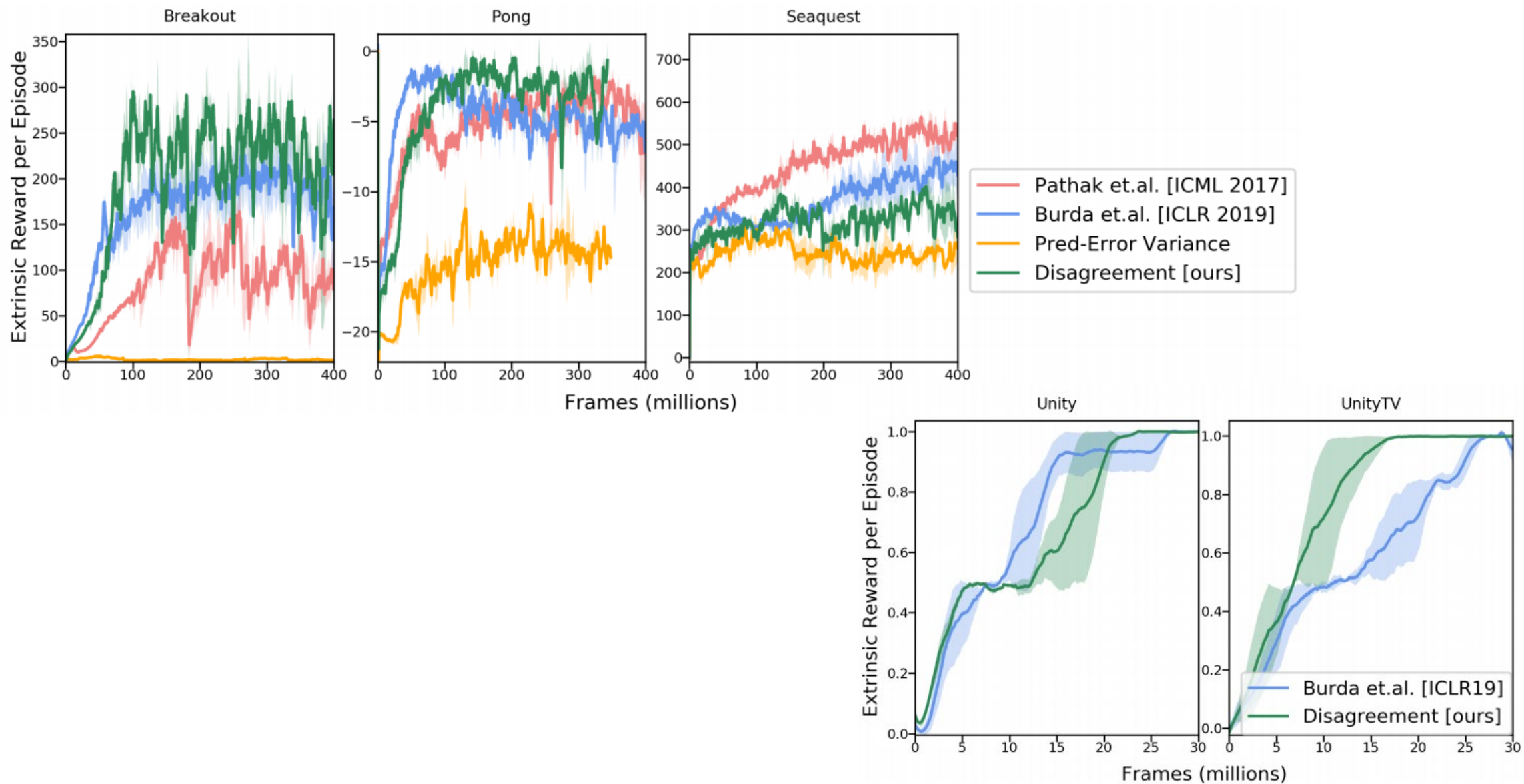
Methods



[1] Pathak, Agrawal, Efros, Darrell. Curiosity-driven Exploration by Self-supervised Prediction. In ICML 2017.

[2] Burda*, Edwards*, Pathak*, Storkey, Darrell, Efros. Large-Scale Study of Curiosity-Driven Learning. In ICLR 2019.

Experiments



THANKS