Medical Diagnosis in Dialogue systems using Deep Reinforcement Learning and Auto Encoder

Mohammad Al Tamimi & Abdelrahman Othman, Computer Science Dept. In Jordan University of Science and Technology

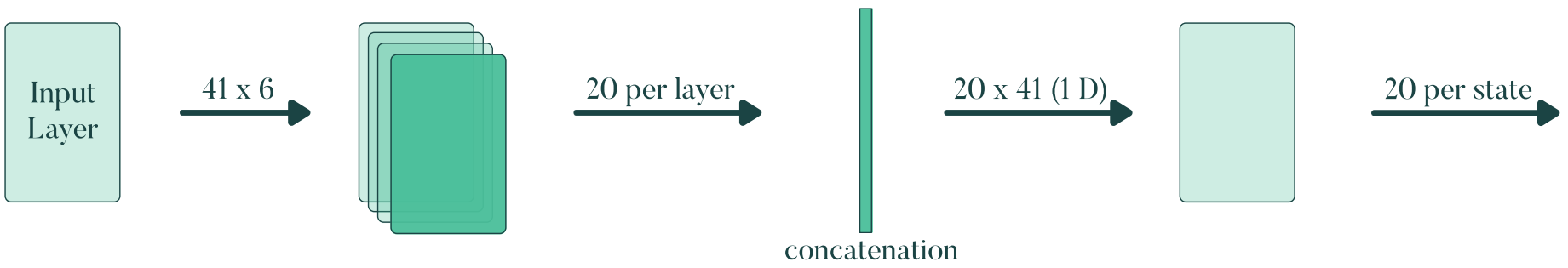
1 INTRODUCTION & BACKGROUND

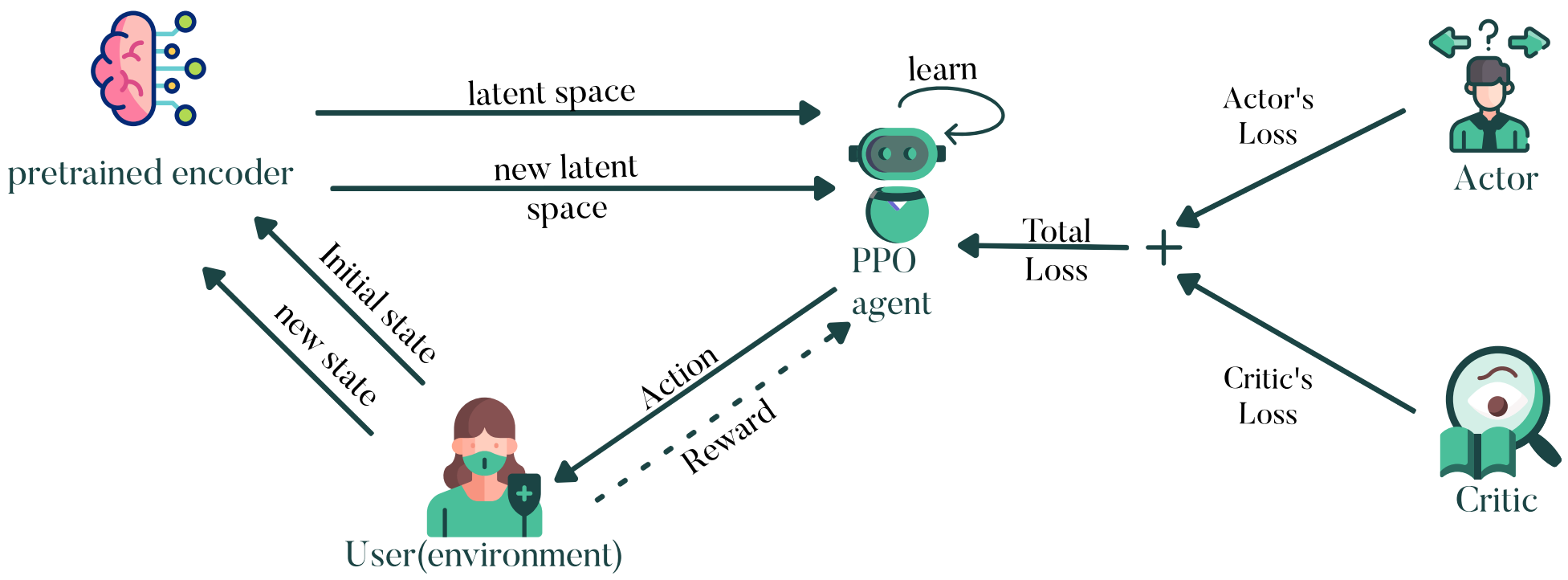
Automated disease diagnosis systems mark a significant advancement in medical technology, reducing the time and reliance on clinicians' expertise. Task-oriented dialogue systems efficiently gather symptoms and make accurate diagnoses. Unlike static rule-based systems, reinforcement learning (RL) allows these systems to adapt from interactions, enhancing performance. Our research integrates Deep Reinforcement Learning (DRL) with Auto Encoders to handle sparse rewards, vast action spaces, and hyperparameter sensitivity, significantly improving diagnostic accuracy and efficiency.

2 METHODOLOGY

We trained an Auto Encoder that compresses data into a manageable latent space, to be inputted into the Proximal Policy Optimization (PPO) algorithm for iterative optimization.

Encoder





5 RESULTS AND EVALUATION

Our experiments show that integrating Auto Encoders significantly improves the performance and stability of our dialogue system. This approach not only enhances accuracy but also ensures robustness and efficiency. It achieved an accuracy of 81%, outperforming the baseline PPO by 13%, and demonstrated stable performance in sensitivity analysis.

Alpha(lr)	Ours	Baseline
0.00002	55%	23%
0.0003	72%	68%
0.002	72%	67%
0.004	69%	19%