A Deep Reinforcement Learning Framework Designed for Bi-level Programming
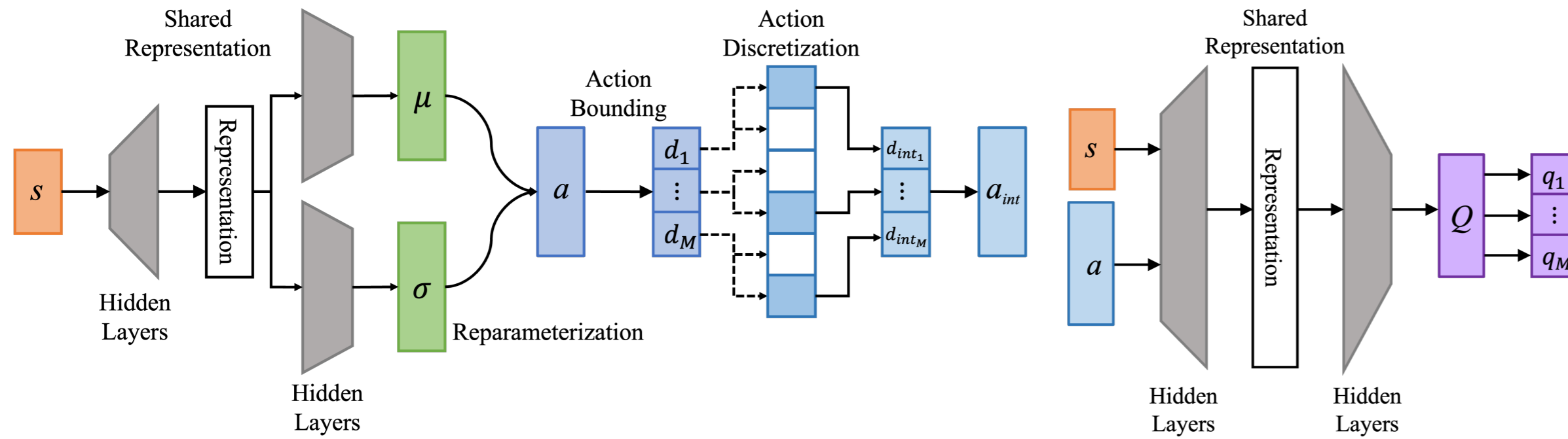
Background

In bi-level programming, it is always an intractable problem to give out efficient solutions to the lower-level optimization and the upper-level optimization simultaneously, especially when caught into a high-dimension dilemma for decision spaces.
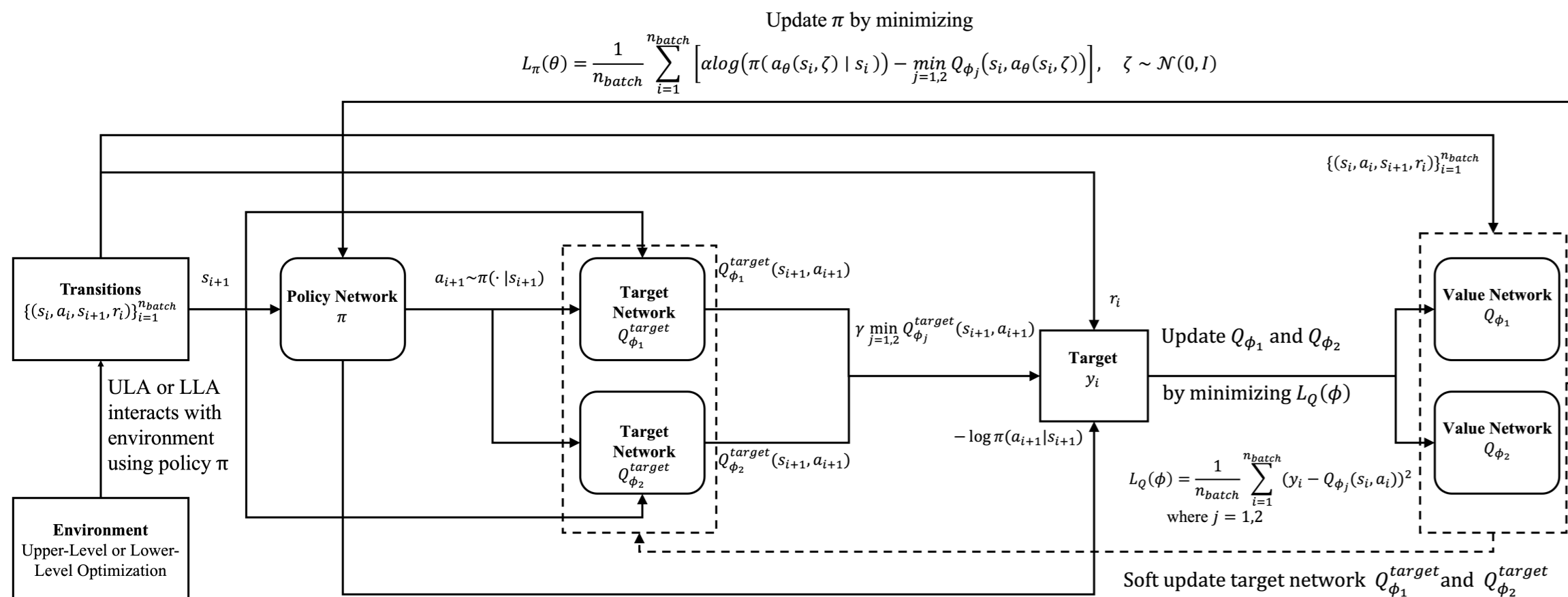
Objective

- Finding an efficient alternative to heuristic algorithms equipped with fast solutions to bi-level programming with aid of deep reinforcement learning
- Exploit an effective approach to solve state-action space composed of high-dimensional decision variables

Model

The policy and value network designed for the Bi-RL:

The total update flowchart of networks designed for RL agent:

Update π by minimizing

$$L_\pi(\theta) = \frac{1}{n_{batch}} \sum_{i=1}^{n_{batch}} \left[\alpha log(\pi(a_\theta(s_i,\zeta) \mid s_i)) - \min_{j=1,2} Q_{\phi_j}(s_i, a_\theta(s_i,\zeta)) \right], \quad \zeta \sim \mathcal{N}(0,I)$$

$$L_Q(\phi) = \frac{1}{n_{batch}} \sum_{i=1}^{n_{batch}} (y_i - Q_{\phi_j}(s_i, a_i))^2$$
where $j = 1,2$

A Multi-modal Document Understanding Method Based on a Pre-trained Model

https://github.com/xxia99/Multi-Modal-Document-Understanding

Background

In business scenarios, it is often necessary to structure the information in a document image, that is, to extract the key-value pair relationships within it.
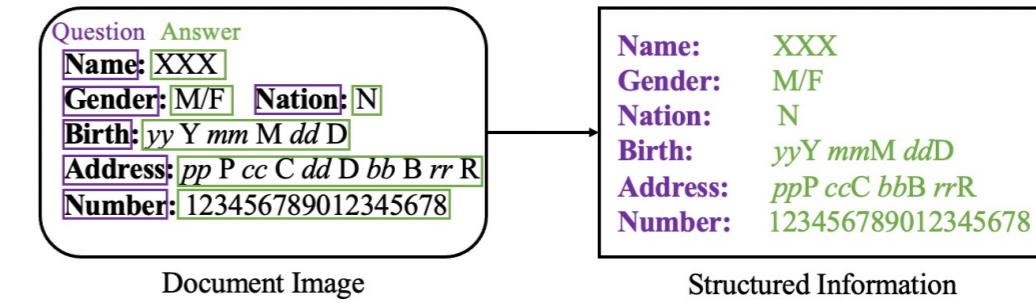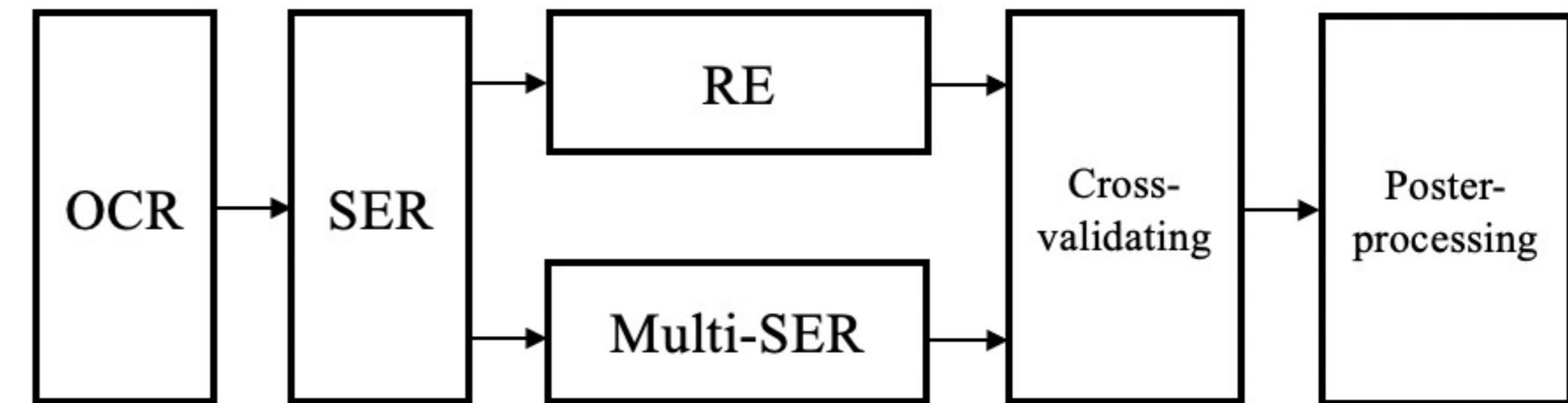

Objective

- Developing a method which can generalize to most templates of document without specialization
- Unsupervised model without heavy workload of labelling and designing

Model: Pretrain and Finetuning
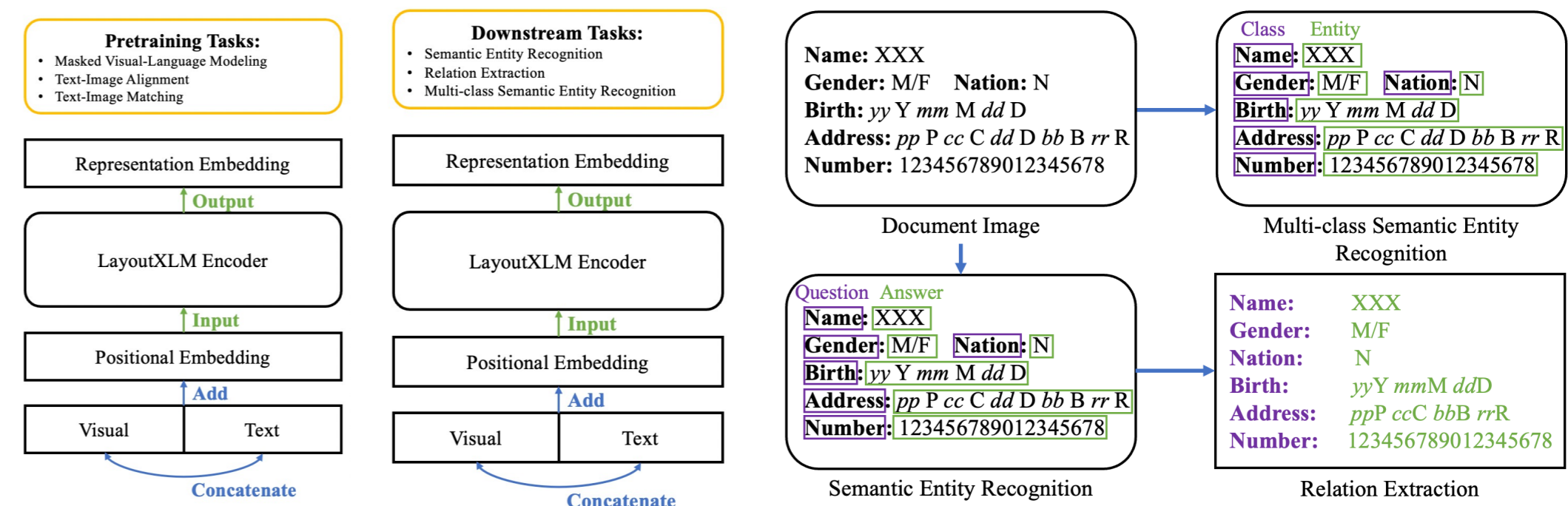
Flowchart

Experiment Results

Model	SER+RE	Multi-SER	Cross-validating	Poster-processing
Accuracy	83%	85%	89%	95%