DSGAN: Generative Adversarial Training for Distant Supervision Relation Extraction
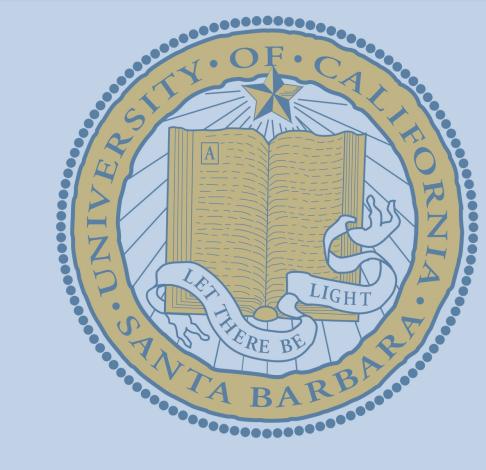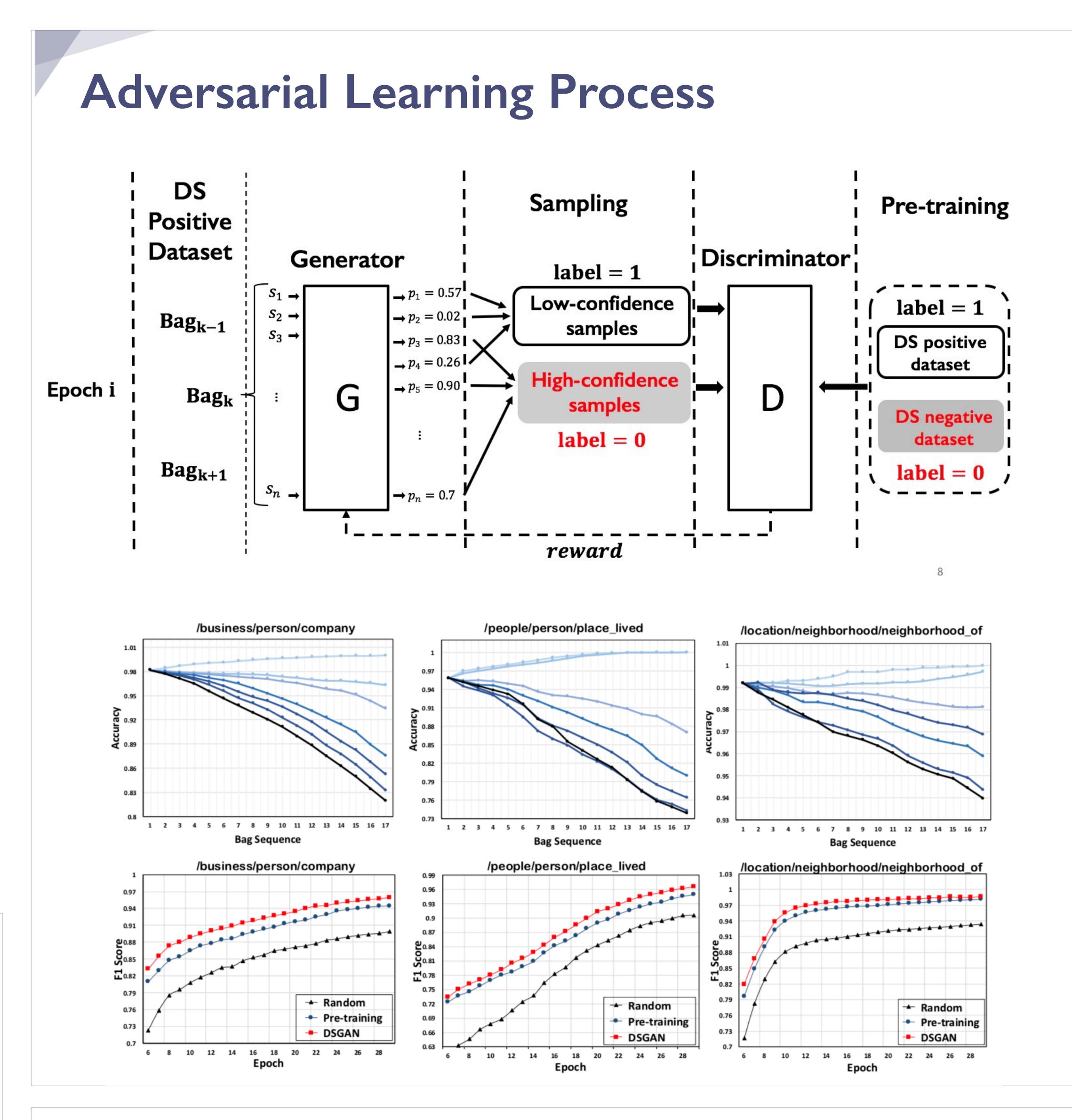
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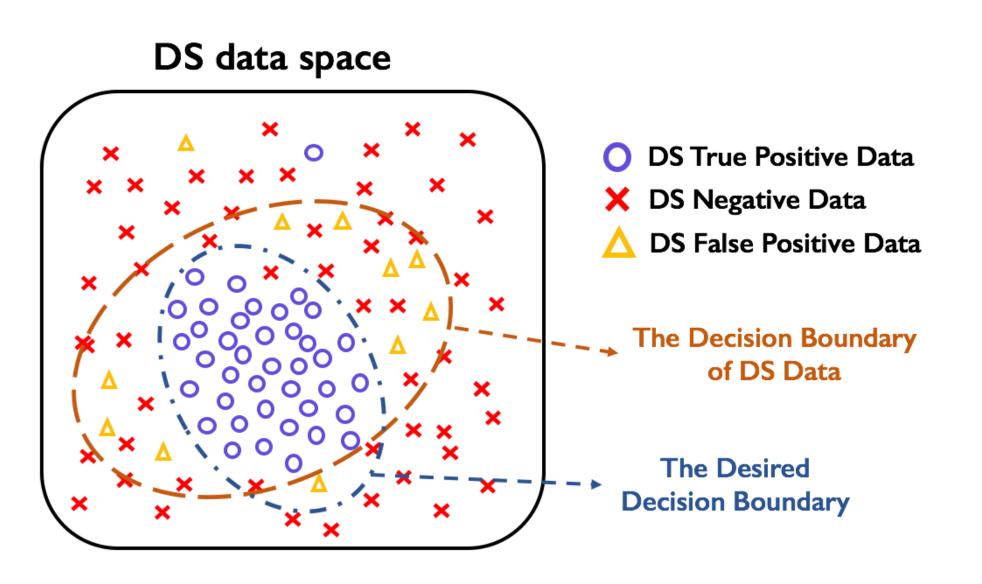
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Motivation

- Recent works find the relatively better samples in a sentence bag
- It is suboptimal compared with making a hard decision of false positive samples in sentence level.

Wrong Labeling

DS data space

○ DS True Positive Data
✕ DS Negative Data
△ DS False Positive Data

The Decision Boundary of DS Data

The Desired Decision Boundary

- Place_of_Death
  i. Some **New York city** mayors – **William O'Dwyer**, Vincent R. Impellitteri and Abraham Beame – were born abroad.
  ii. Plenty of local officials have, too, including two **New York city** mayors, James J. Walker, in 1932, and **William O'Dwyer**, in 1950.

Solutions

Inspired by Generative Adversarial Networks, we regard the positive samples generated by the generator as the negative samples to train the discriminator. The optimal generator is obtained until the discrimination ability of the discriminator has the greatest decline.

- Generator

$$L_G = \sum_{s_j \in T} \log p_D(s_j)$$

- Discriminator

$$L_D = -\left(\sum_{s_j \in (B_i - T)} \log p_D(s_j) + \sum_{s_j \in T} \log(1 - p_D(s_j)) \right)$$

Adversarial Learning Process

Experimental Data

- **Reidel Dataset (Riedel et al., 2010)**
  - 52 actual relation + NA
  - Training set: 522,611 sentences, 281,270 entity pairs and 18,252 relational facts
  - Test set: 172,448 sentences, 96,678 entity pairs and 1,950 relational facts

Performance