Generative Adversarial Network (GAN) has been a great success in generating natural looking images. However, the original GAN framework is limited to generate continuous data because the gradient computation involves backpropagation through generator’s output. In this work, we proposed a novel framework SeqGAN, which elegantly combines adversarial training with policy gradient algorithm to generate discrete sequential data (e.g. natural language). So far many variants of SeqGAN have been proposed and successfully applied to a wide variety of tasks including dialogue systems (Li et al., 2017), machine translation (Yang et al., 2017), image caption (Dai et al., 2017), music generation (Lee et al., 2017) and recommender systems (Yoo et al., 2017).

**Algorithm 1 Sequence Generative Adversarial Nets**

**Require:** generator policy $G_{θ}$; roll-out policy $G_{θ}$; discriminator $D_{φ}$; a sequence dataset $S = \{X_{1:T}\}$

1. Initialize $G_{θ}$, $D_{φ}$ with random weights $θ$, $φ$.
2. Pre-train $G_{θ}$ using MLE on $S$.
3. $β \leftarrow θ$.
4. Generate negative samples using $G_{θ}$ for training $D_{φ}$.
5. Pre-train $D_{φ}$ via minimizing the cross entropy.
6. repeat
7. for g-steps do
8. Generate a sequence $Y_{1:T} = (y_{1}, \ldots, y_{T}) \sim G_{θ}$.
9. for t in $1 : T$ do
10. Compute $Q(α = y_{t}; s = Y_{1:t-1})$ by Eq. (4).
11. end for
12. Update generator parameters via policy gradient Eq. (8).
13. end for
14. for d-steps do
15. Use current $G_{θ}$ to generate negative examples and combine with given positive examples $S$.
16. Train discriminator $D_{φ}$ for $k$ epochs by Eq. (5).
17. end for
18. $β \leftarrow θ$.
19. until SeqGAN converges.