The Human Pose Prediction Problem: predict a sequence of future human poses given a sequence of human poses observed in the past.

Challenges: previous methods for this prediction problem were mainly based on purely supervised training of various RNN architectures, but they face two severe challenges:

- Generalize poorly over unseen domains of the human motion space.
- Hard to keep a balance between long-term and short-term prediction accuracies.

Our solution: we propose a new reinforcement learning formulation for the problem of human pose prediction, and use a combination of two imitation learning algorithms to train our pose prediction agent under this RL formulation: one is based on behavioral cloning and the other one is based on generative adversarial imitation learning.

**RL Formulation of Human Pose Prediction**

**Overview**: we define a Markov Decision Process to model the generation of pose prediction sequences. We divide the whole prediction sequence evenly into K steps, where each step contains a window of m pose vectors to predict.

**Definition**: at each step i during the prediction:

- **State** - the state of the MDP is defined as the list of all previous pose vectors: \( s_i = \{x_{i-1}, \ldots, x_1\} \)
- **Action** - the action of the MDP is defined as the next length m window of pose vectors: \( a \)
- **Transition Dynamic** - deterministic: \( s_{i+1} = s_i \cup a \)

**Policy Generator Network**: we adopt a sequence-to-sequence architecture for our prediction agent policy generator network. It generates future pose sequences:

- **Critic Network**: we adopt a seven-layer fully connected neural architecture for our critic network in WGAIL-div training.

**Experiment Results**

**Results on the Human 3.6M Dataset**: with the Mean Angle Error (MAE) performance metric

**Visualization of Prediction Results**

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