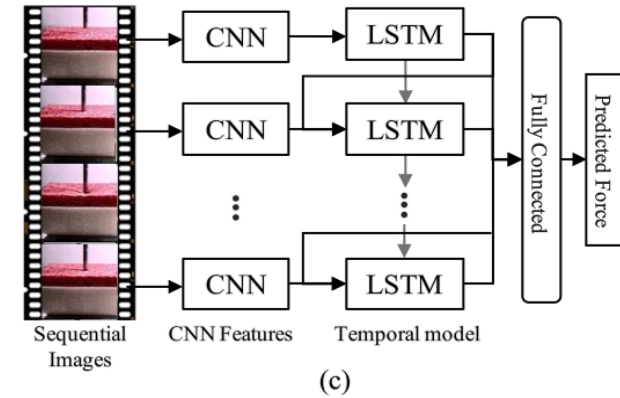
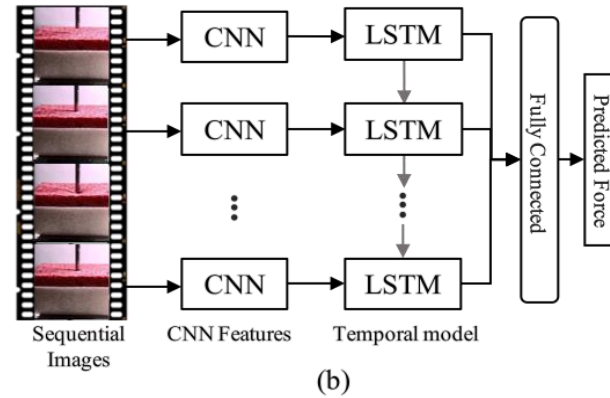
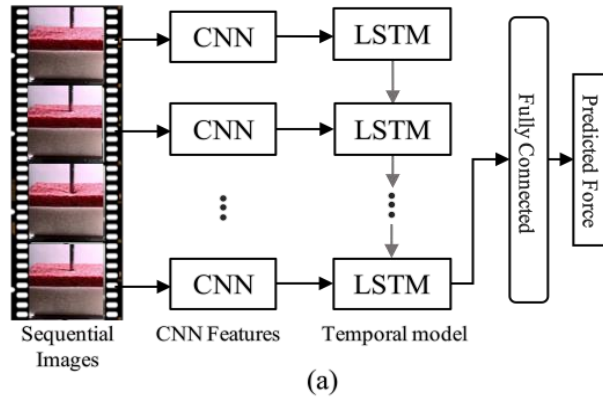
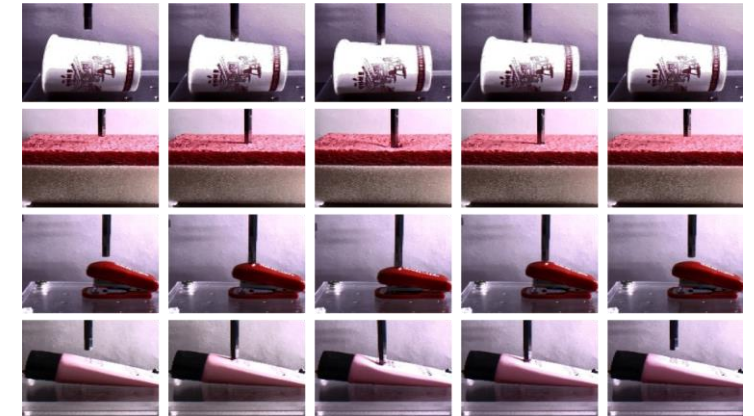
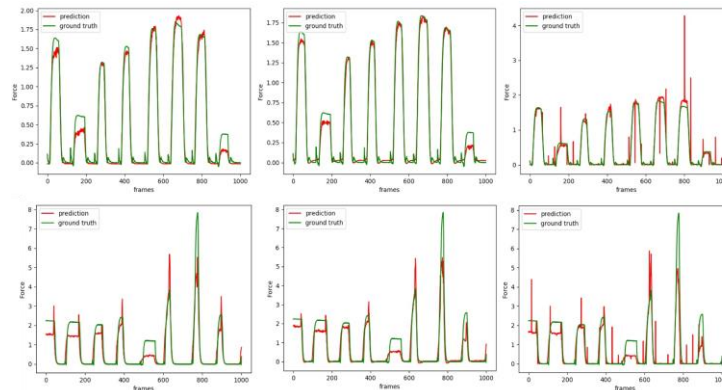
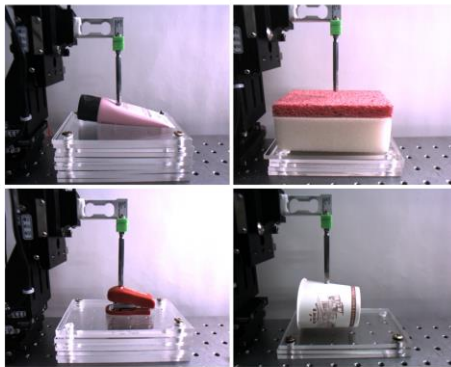
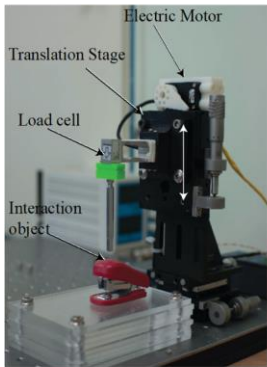


Which LSTM Type is Better for Interaction Force Estimation?



- Three types of a deep learning model for interaction force estimation.
- The CNN feature extraction part is the same for all three types of models.
- (a) is a form in which the spatio-temporal embedding vector extracted from the last hidden unit of lstm is transferred to the fully connected (FC) layer.
- (b) develops in (a) and transfers all the output of the LSTM to the FC layer.
- (c) concatenates the previous hidden state from each cell of LSTM to current CNN features and inputs it to the next cell.



- Configuration of the interaction force measurement environment
- (a): Robot arm which consists of an electronic motor, a translation stage, and a load cell.
- (b): four objects that interact with the robot arm.
- Qualitative evaluation of models. (a), (b) and (c) represent the LSTM types 1, 2, and 3.
- The red line represents the predicted value and the green line represents the ground truth.
- The above is a good sample, and below is a bad sample.
- The sample showing the interaction process.
- During the interaction, the object was immobilized using an adhesive to fix it, and then robot arm interacts with the objects.
- We collect a total of 336 clips from 17 videos