

# 1 DISCUSSION

We observed that in Figure 4 (a), some of the baseline models exhibit periodic oscillations in the MSE as the number of prediction frames increases, with the oscillation growing larger. This phenomenon is quite unusual because, under normal circumstances, a well-trained model should not exhibit such erratic oscillations. We discovered that these baselines oscillate with a period of 4, which is quite specific, as it matches the number of training steps we set. In our training, we use four frames to predict one frame and train by predicting four steps. During testing, we also use four frames to predict one frame and predict for forty steps. We suspect that this is because some models struggle to learn the motion features during short-time sequence training.

To investigate this, we set up three validation experiments on LSM:

- (a) Four frames to predict one frame, training with four prediction steps (original experiment),
- (b) Four frames to predict one frame, training with four prediction steps, adjusting the batch size,
- (c) Four frames to predict one frame, training with six prediction steps.

We found the following:

- In (a) and (b), oscillations with a period of 4 appeared at the start of training and persisted throughout, even when the epoch reached 200 and the validation set metrics had plateaued at their minimum, still oscillating (Figure 1).
- In (c), oscillations with a period of 6 initially appeared, but as training progressed, the oscillations gradually weakened (Figure 2).

We believe these models still need improvement when working under such a training regime with relatively short steps.

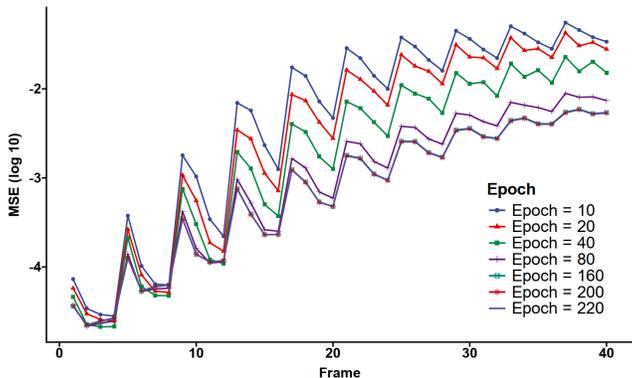


Figure 1: Four frames to predict one frame, training with four prediction steps. The per-frame error vs. frame number plot at certain epochs.

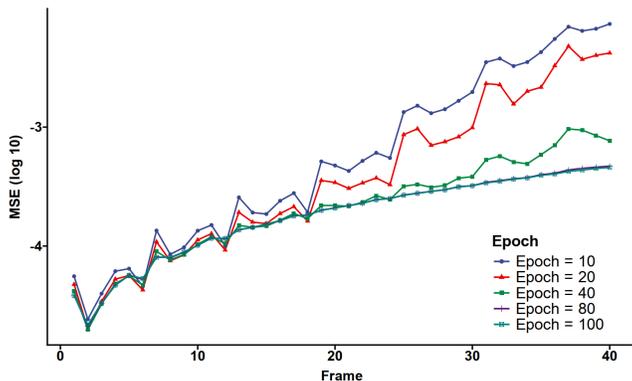


Figure 2: Four frames to predict one frame, training with six prediction steps. The per-frame error vs. frame number plot at certain epochs.