# Very Short-Term Rainfall Forecast Using Memory-Efficient Bidirectional Transformers

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Accurate nowcasting of precipitation is essential to prevent casualties and economic losses due to heavy rainfall. While deep learning models, such as the U-Net convolutional neural network (CNN) and generative adversarial network (GAN), have been proposed for this task, they have shown limitations in performance. A promising state-of-the-art approach, the autoregressive transformer, has demonstrated impressive generative modeling capabilities compared to GAN models. However, its slow inference time makes it impractical for precipitation nowcasting. In this presentation, we present the results of our research on precipitation nowcasting with lead times of 0-6 hours, utilizing a generative model known as Memory-Efficient Bidirectional Transformers (MeBT). Unlike the autoregressive transformer, MeBT offers rapid inference times, making it suitable for operational precipitation nowcasting. We conducted forecast skill evaluations of MeBT's performance, comparing it to established traditional methods such as the U-Net convolutional neural network (CNN), optical flow models, and Eulerian Persistence. The MeBT model consistently outperforms these methods in predicting precipitation events across all four seasons at lead times of 0-6 hours. Specifically, it outperforms the CNN model in terms of predicting the structure, amplitude, and location of precipitation. Moreover, when compared to optical flow models, the MeBT model provides superior forecasts for dynamical processes such as the development and decay of precipitation fields. We believe that the MeBT model has the potential to enhance the accuracy of operational nowcasting models.