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Model Description and Training Details

Model Overview:
The model used in this project combines various deep neural networks such as Convolution Neural Network (CNN) and Long Short Term Memory (LSTM) with 5,122,401 parameters tailored for handling audio denoising tasks. It's designed to process a high volume of operations efficiently, performing 10,037,545,066 Multiply-Add Operations per Second (MACS) with approximately double the operations in Floating Point Operations per Second (FLOPS). The model operates effectively in real-time applications, achieving a Real-time Factor (RTF) of 5.0 in causal scenarios.

Training Specifications:
- Number of Training Steps: The model underwent training for 48 epochs, totalling 211,435 steps.
- Training Time: Each epoch required about 22 minutes using GPU acceleration.
- Memory Footprint: During training, the model utilized 146 GB of shared RAM on an NVIDIA RTX A4500 GPU.
- Hardware Specifications: Training and inference were conducted on a single NVIDIA RTX A4500 GPU equipped with 146 GB of shared RAM.

Training Process Details:
- Data Augmentation: No data augmentation techniques were applied during training.
- Batch Size: The model was trained using a batch size of 16.
- Optimization Algorithm: RMSProp was employed as the optimization algorithm.
- Learning Rate Schedule: The learning rate was dynamically adjusted using ReduceLROnPlateau, reducing it by a factor of 0.8 after 5 epochs without improvement in validation loss.
- Early Stopping: ModelCheckpoint callback was used to save the best model based on validation loss.

Reproducibility:
Link to GitHub repo: https://github.com/mtanveer1/AVSEC-3-Challenge

System Constraints and Requirements:
- Limitations: There are no known limitations or constraints specific to this system.
- Requirements: Fundamental data science libraries like Numpy and Pandas. NVIDIA Cuda framework for GPU accelerated training and interference, PyTorch Lightning framework. Exact version-specific requirements are mentioned in the README file of the GitHub repository.