

DEPARTMENT OF ECE
COLLEGE OF ENGINEERING GUINDY, ANNA UNIVERSITY, CHENNAI

EC5811 – PROJECT II

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Audio watermarking for copyright protection using Diffusion Model

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ABSTRACT

Aim / Objective

The objective of this project is to develop a robust and imperceptible audio watermarking system using diffusion models to enhance copyright protection. The watermark should be inaudible within the host audio while ensuring strong resistance against attacks such as compression, noise addition, and filtering.

Problem Definition

With the rapid digital distribution of audio content, unauthorized copying and modification pose a significant challenge. Traditional watermarking techniques often struggle to maintain a balance between robustness and imperceptibility. This project aims to leverage diffusion models to refine the watermark embedding and extraction process, ensuring high security and fidelity.

Proposed Methodology

1. Watermark Embedding: A watermark is embedded into an audio signal while ensuring minimal distortion.
2. Noise Addition (Forward Process): The diffusion model progressively adds noise to the watermarked audio.
3. Denoising (Reverse Process): The model is trained to remove noise iteratively and reconstruct the original signal with the embedded watermark intact.
4. Watermark Extraction: The trained model differentiates the watermark from external noise, ensuring accurate extraction.
5. Evaluation: The system's performance is assessed based on PSNR (Peak Signal-to-Noise Ratio) and loss reduction during training.

Work Carried Out So Far

- Implementation of initial diffusion model for audio signal denoising.
- Analysing the PSNR and the Loss of audio Signals in Diffusion model.
- Preliminary tests on embedding and extracting watermarks.

Future Work

- Enhance the model's robustness against various audio distortions.
- Optimize computational efficiency for real-time applications.
- Train Diffusion model for Watermarked audio.
- Validate performance on diverse datasets and attack scenarios.

Software

- Software: Python, Vscode, Conda

Signature of the Team members

Signature of the Supervisor