Research

1. **LCNN with Power-Spectrogram Features**
    - **Technical Innovation:** This approach uses a lightweight Convolutional Neural Network (LCNN) to process power-spectrogram features, optimized for computational efficiency, making it suitable for real-time applications.
    - **Performance Metrics:** Achieved a 4.38% Equal Error Rate (EER) on the ASVspoof 2019 Physical Access (PA) task, indicating high accuracy.
    - **Promising for Needs:** Its low EER and lightweight nature suggest it can handle real-time detection, crucial for analyzing conversational speech in dynamic environments.
    - **Limitations:** May struggle with generalization to unseen attacks or datasets, as evidenced by lower performance on real-world data like the Teams Meeting dataset, with an F-score of 0.40.
2. **ResNet with Mel-Spectrogram Features**
    - **Technical Innovation:** Employs a ResNet architecture, known for deep learning effectiveness, adapted for mel-spectrogram inputs to capture audio patterns.
    - **Performance Metrics:** Recorded a 7.39% EER on the ASVspoof 2019 Logical Access (LA) task, showing strong detection capabilities.
    - **Promising for Needs:** ResNet's ability to handle complex patterns makes it effective for AI-generated speech, with potential for real-time if optimized.
    - **Limitations:** Computational intensity may pose challenges for real-time deployment without optimizations, and real-world performance needs further validation.
3. **AASIST (Advanced Audio Spoofing Detection Model)**
    - **Technical Innovation:** Likely incorporates advanced architectures such as attention mechanisms or graph networks, enhancing detection through sophisticated feature extraction.
    - **Performance Metrics:** Achieved an 18.62% EER on the ASVspoof 2021 DeepFake (DF) task, indicating competitive accuracy.
    - **Promising for Needs:** Offers high accuracy, potentially generalizing well across datasets, though its complexity may affect real-time capabilities.
    - **Limitations:** May require more computational resources, impacting efficiency in real-time scenarios.