interpretable due to their "black box" nature, they adapt easily to new patterns, making DL highly effective for dynamic media challenges [19].

7.6 Project Implementation and Testing

The testing phase evaluated the deepfake detection system across multiple scenarios, including videos, images, audio, and mixed media. Tests assessed the model's accuracy, performance under large datasets, real-time API responsiveness, and stability after retraining. While most tests met expectations with high accuracy and efficiency, some highlighted areas for improvement, such as low-resolution image detection. Key achievements included successful metadata masking, fast API responses, and consistent accuracy across varying media quality, ensuring a reliable and robust system for deepfake detection.

Table 7.6: Test Cases

Test Case ID	Description	Model	Test Data	Expected Outcome	Actual Outcome	Status
TC-001	Video file deepfake detection	Video Deepfake Detection Model	Sample real and fake videos	Detects fake videos with 72%+ accuracy	72% accuracy in detection	Fail
TC-002	High-resolution image deepfake detection	Image Deepfake Detection Model	Sample real and fake images	Accurate detection with <5% false positives	Detected all fakes; 4% false positives	Pass
TC-003	Low-resolution image deepfake detection	Image Deepfake Detection Model	Sample low-res real and fake images	90%+ accuracy in detection	88% accuracy; some fakes missed due to resolution	Fail
TC-004	Deepfake audio detection	Audio Deepfake Detection Model	Sample real and fake audio	Accurate detection with <9% false positives	Detected all fakes; 3% false positives	Pass
TC-005	Mixed-media test	Video & Audio Models	Sample deepfake video	Both models accurately	95% accuracy	Pass

	(combined audio-video)		with audio overlays	detect manipulations	for both models	
TC-006	Performance under large dataset	All Models	Large dataset of mixed files	Completes within 1 hour for all files	Completed in 45 minutes	Pass
TC-007	Metadata masking test	All Models	Real and fake files with metadata	Metadata masked, no data leakage	All metadata successfully masked	Pass
TC-008	Model API response check	All Models	Real-time API request	API responds within 2 seconds per request	Average response time: 1.8 seconds	Pass
TC-009	Accuracy threshold verification	All Models	Varying quality fake media	Accuracy consistently meets 95% threshold	96% accuracy across all quality levels	Pass
TC-010	Consistency check (retraining stability)	All Models	Retrained model	Model maintains accuracy post-retraining	Accuracy consistent pre- and post-retraining	Pass