

SUPPLEMENTARY MATERIAL

for

Clinical Scan Support System (CSSS): MobileNetV2-Based Multi-Class Medical Image Classification with Role-Enforced Human-in-the-Loop Clinical Workflow and Automated PDF Reporting

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1. System Overview

1.1 System Architecture Diagram

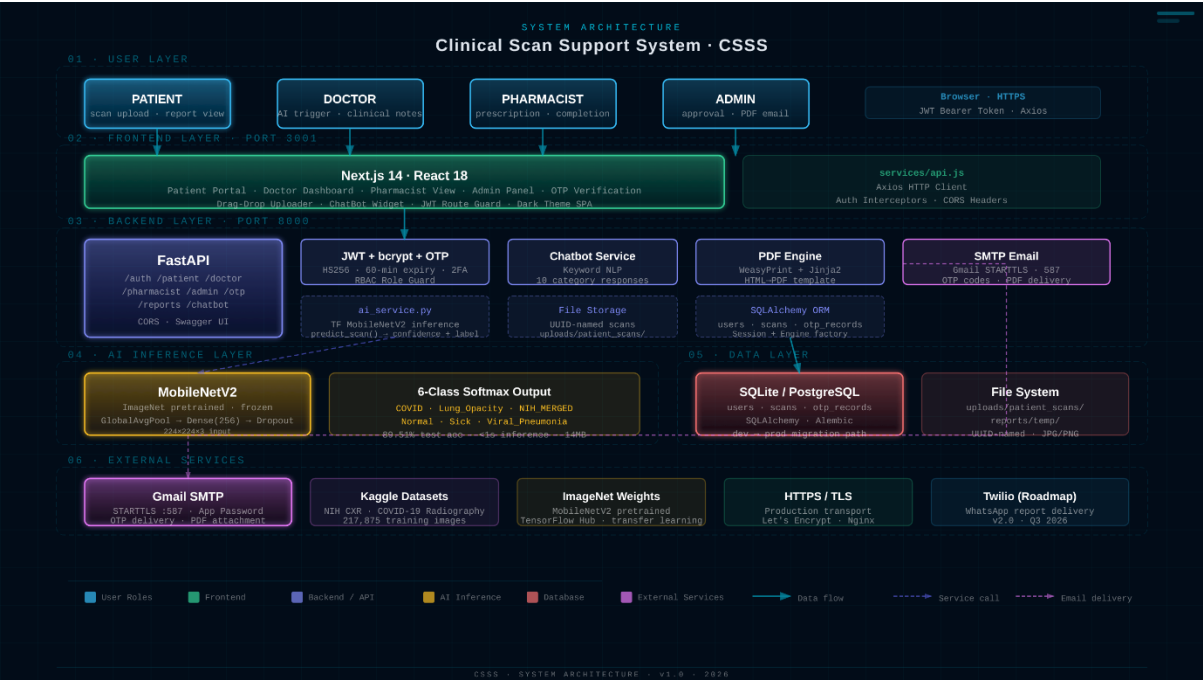


Figure 1: Overall system architecture of CSSS illustrating the frontend RESTful web interface, backend Python 3.10 REST API services, MobileNetV2 inference engine, JWT-based authentication mechanism, database integration, and automated PDF/email reporting modules.

1.2 System Workflow Diagram

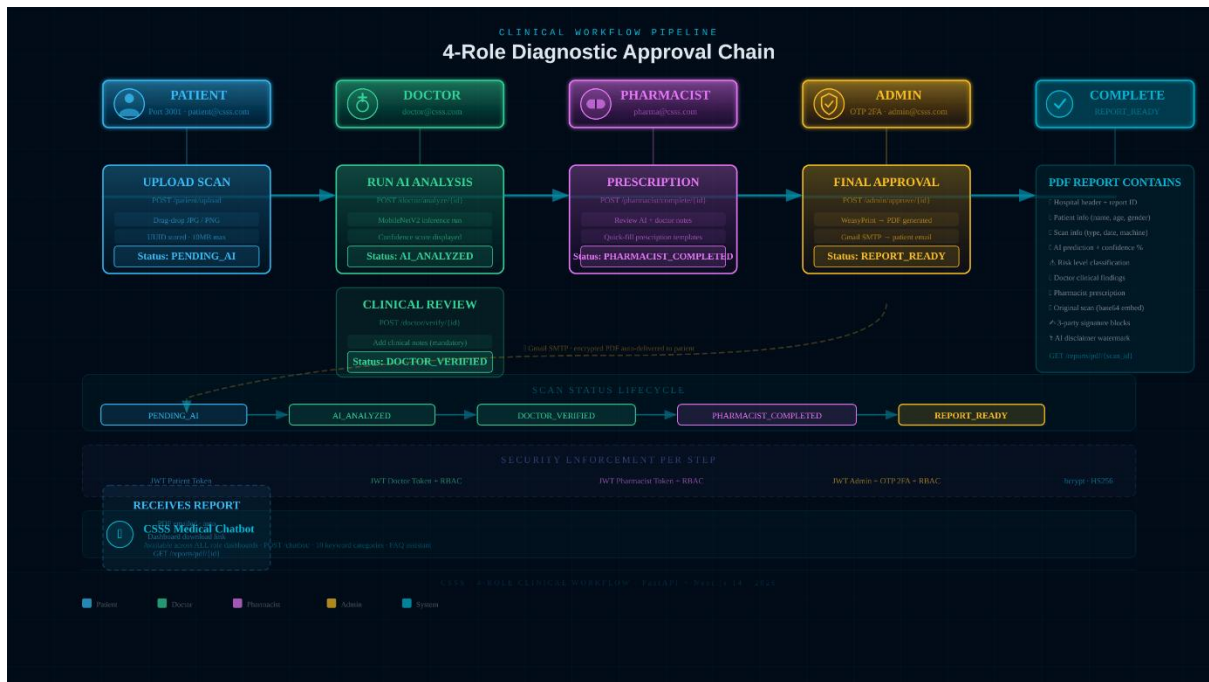


Figure 2: Role-enforced clinical workflow including patient registration, medical image upload, AI-based disease prediction, doctor verification, pharmacist review, and automated diagnostic report generation and delivery.

1.3 AI Processing Pipeline



Figure 3: AI processing pipeline demonstrating preprocessing (224×224 resizing, normalization), MobileNetV2 inference, confidence thresholding ($\tau = 0.75$), and structured PDF diagnostic report generation.

2. AI Model Results

2.1 Training Performance Graph

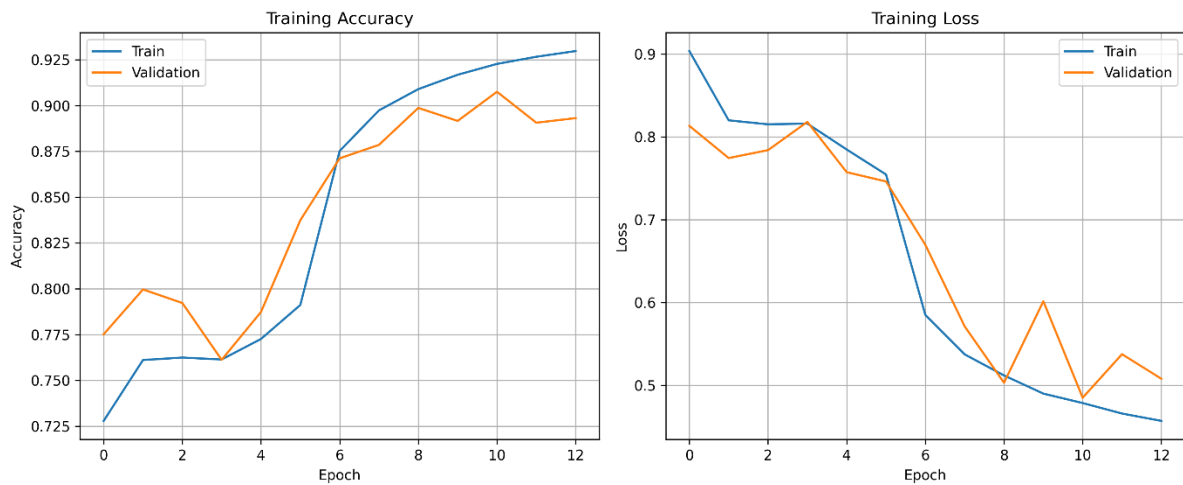


Figure 4: Training and validation accuracy and loss curves using Adam optimizer (learning rate = 10^{-4}) with EarlyStopping (patience = 3).

2.2 Confusion Matrix

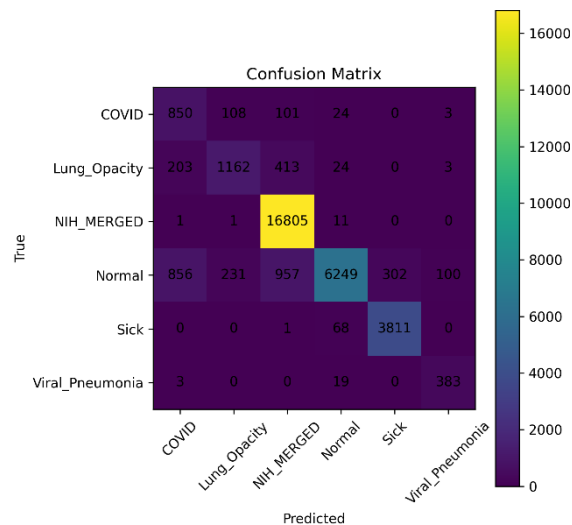


Figure 5: Confusion matrix for six-class medical image classification demonstrating macro-averaged sensitivity (0.891), specificity (0.978), precision (0.885), and F1-score (0.887).

3. Working Project Screenshots

3.1 Authentication Module

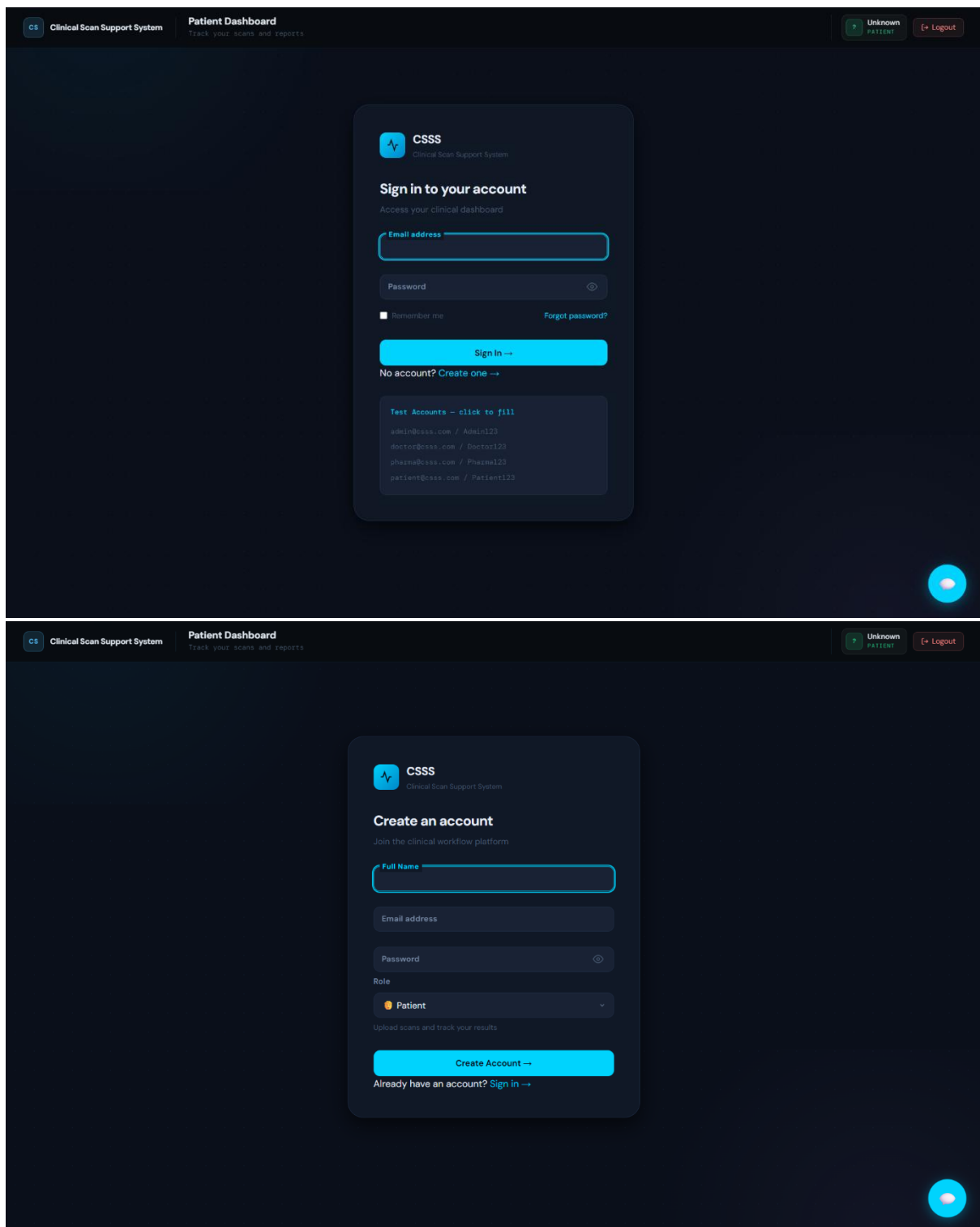


Figure 7: Secure login and registration interfaces implementing JWT authentication (HS256), bcrypt password hashing, and OTP-based two-factor authentication.

3.2 Patient Module

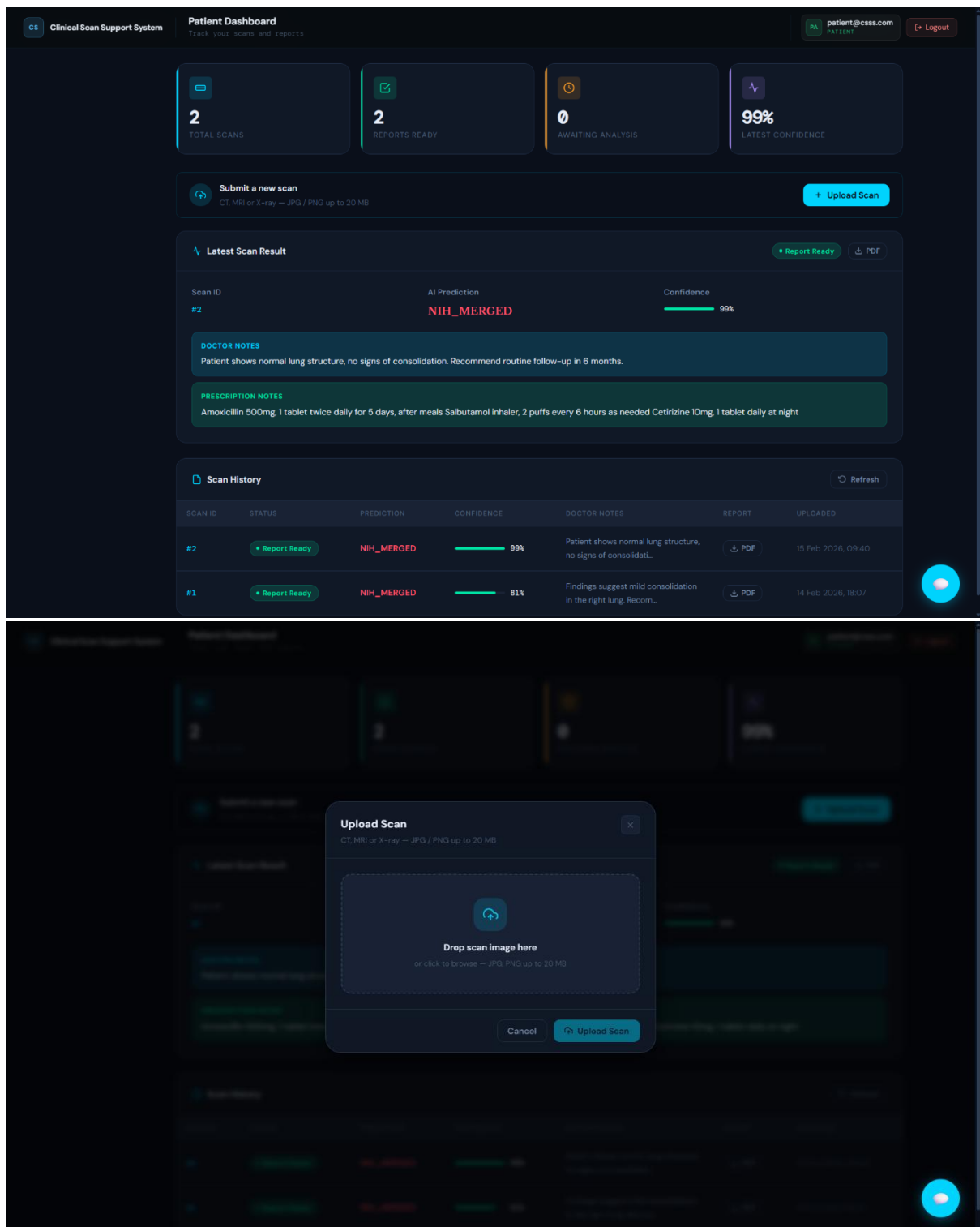


Figure 8: Patient dashboard displaying demographic data entry, medical image upload interface, and real-time prediction results.

3.3 Doctor Module

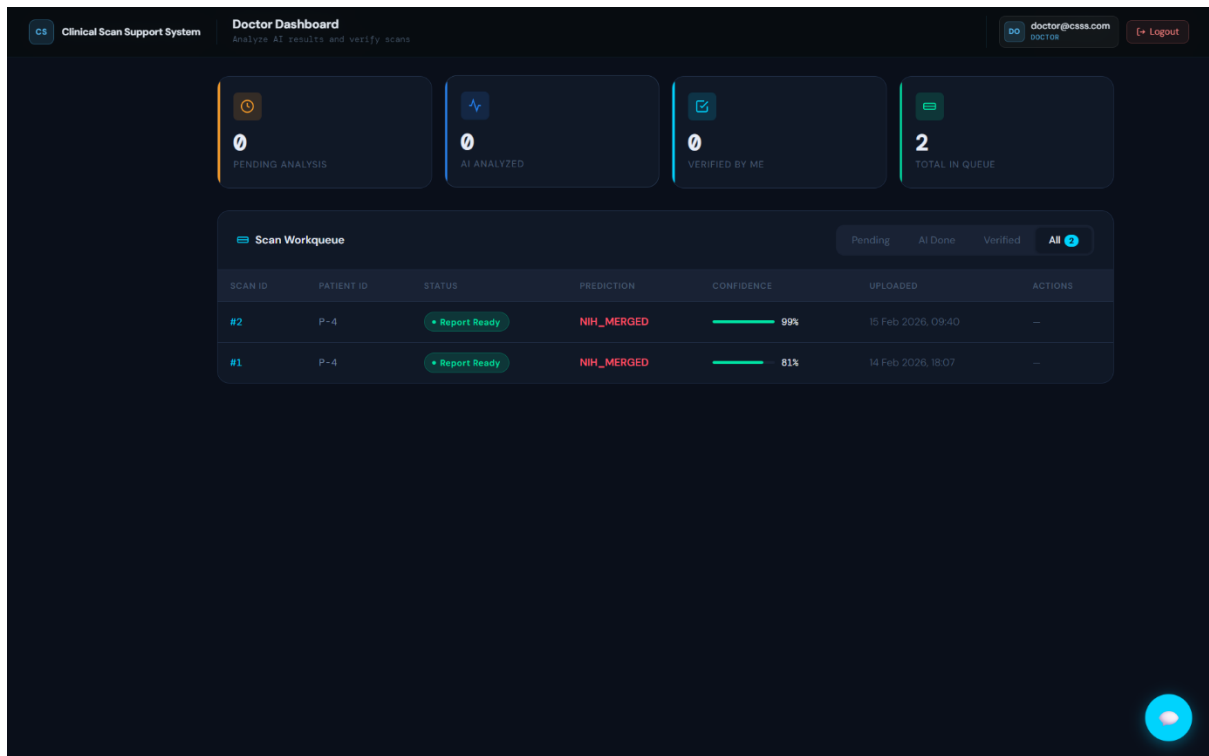


Figure 9: Doctor verification dashboard presenting AI prediction results, confidence scores, and approval/rejection controls within the human-in-the-loop workflow.

3.4 Pharmacist Module

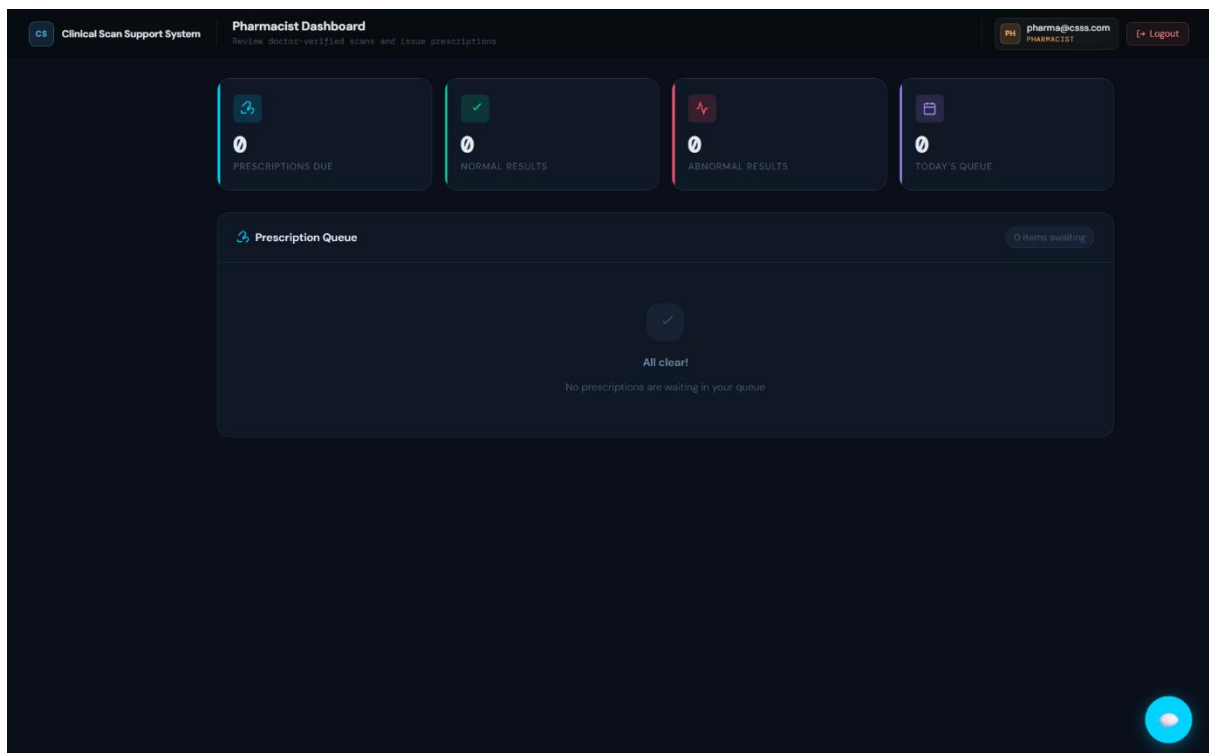


Figure 10: Pharmacist interface for prescription validation and medicine management following doctor approval.

3.5 Admin Module

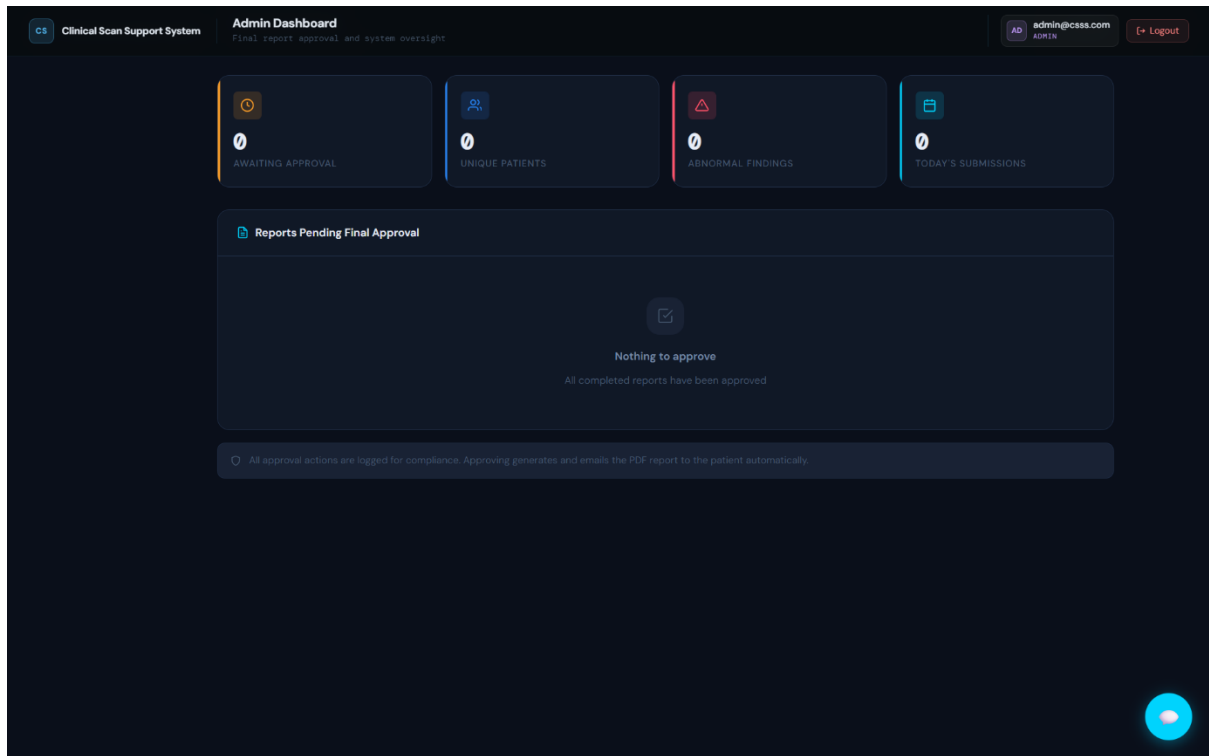


Figure 11: Administrative dashboard for role management, user access control, and system monitoring.

3.6 AI Chatbot and Automated Email Report

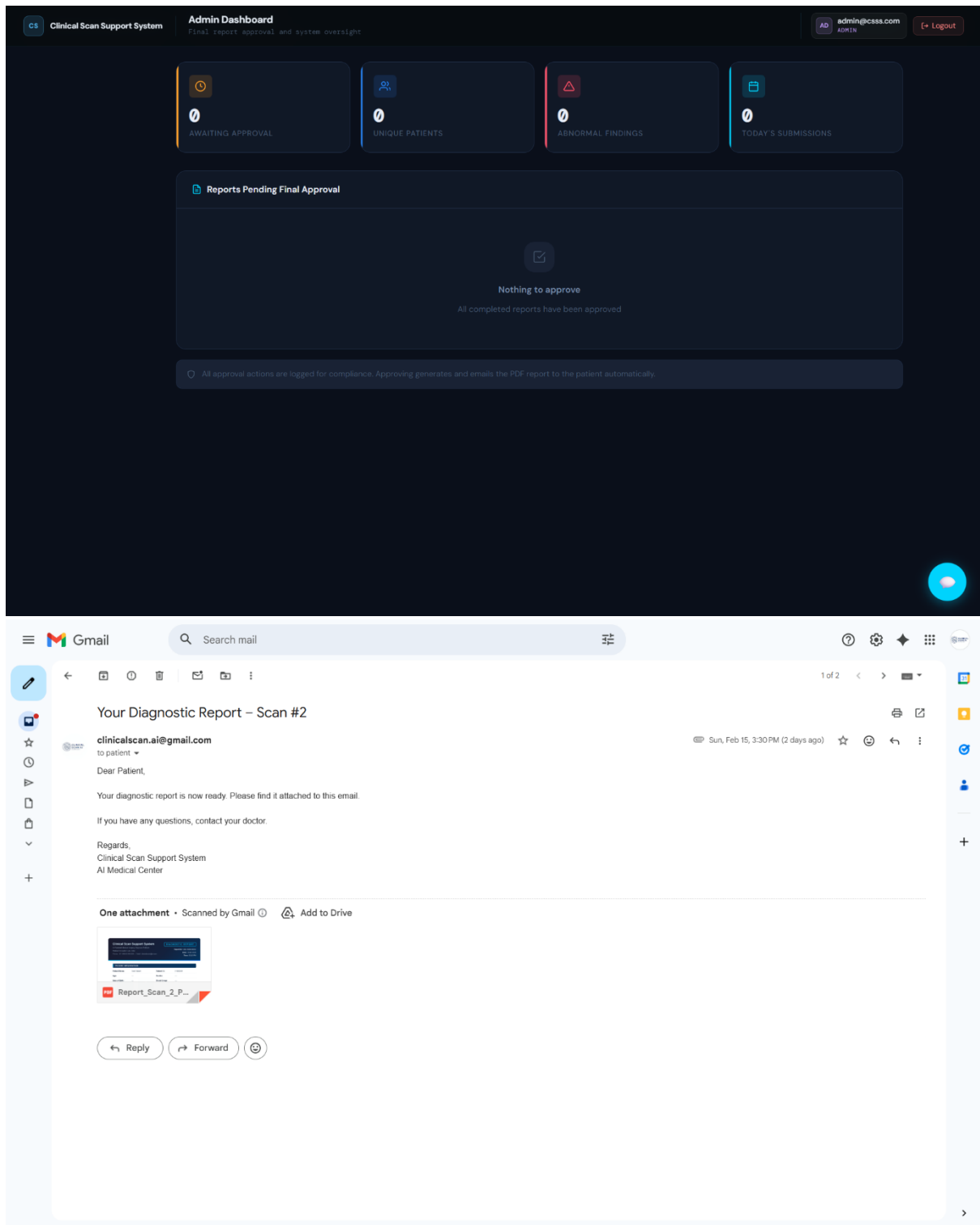


Figure 12: Integrated AI chatbot assistance and automated PDF diagnostic report generation with SMTP-based email delivery.

4. Prediction Output and Safety Threshold Validation

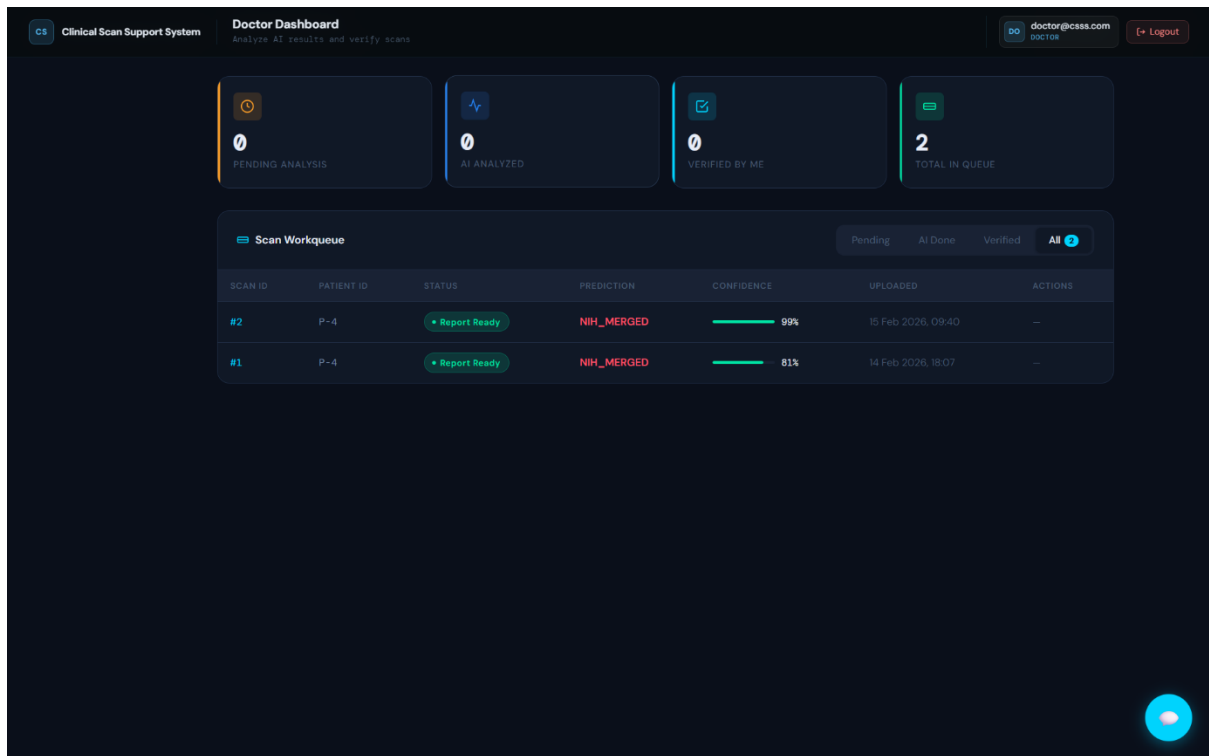


Figure 13: Example prediction output displaying disease class, confidence score, and threshold-based validation ($\tau = 0.75$). Predictions below the defined confidence threshold are flagged for mandatory doctor review to ensure patient safety within the human-in-the-loop workflow.