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(54) **SYSTEM AND METHOD FOR HEALTHCARE DIAGNOSTICS USING FOUNDATION MODELS WITH UNCERTAINTY TRIAGE**

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(57) **ABSTRACT**

The present invention discloses a system and method for healthcare diagnostics using foundation models with uncertainty triage, designed to deliver reliable, explainable, and safety-assured diagnostic outcomes across multimodal clinical data. The invention integrates a foundation model processor pretrained on diverse medical datasets with an uncertainty estimation processor configured to quantify epistemic and aleatoric uncertainties in diagnostic predictions. A triage control unit dynamically classifies cases into high, medium, and low-confidence categories based on computed uncertainty indices, ensuring that only high-confidence cases are automatically finalized, while uncertain or ambiguous cases are routed for clinician review. The system further incorporates a feedback adaptation processor that recalibrates model parameters and uncertainty thresholds based on expert feedback, maintaining alignment with clinical reliability standards over time. Implemented as a hardware-integrated diagnostic device, the invention supports real-time inference, secure data handling, and interpretability visualization through uncertainty heatmaps and attention overlays.