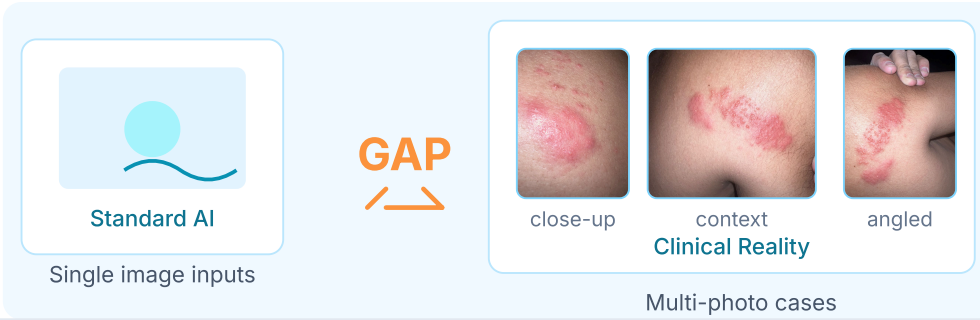
PelliScope: Intelligent Skin Health with AI

Attention-Based Multi-Instance Learning for Real-World Dermatology

HawkFranklin Research

Background: A Critical Gap in Dermatology AI



Objective: A Compute-Efficient, Case-Level Pipeline

- **Aggregate** 1-3 photos per case via Multiple Instance Learning (MIL).
- **Leverage** frozen dermatology foundation embeddings for efficiency.
- **Deliver** tunable operating points for 10 common conditions.

Diagnostic Classes: *Eczema, Allergic & Irritant Contact Dermatitis, Insect Bite, Urticaria, Psoriasis, Folliculitis, Tinea, Herpes Zoster, & Drug Rash.*

Methods: Comprehensive Evaluation of Multiple Instance Learning Model

Input: Proprietary Dataset
Client's proprietary dataset
10 diagnostic skin lesion classes

→

Step 1: Feature Extraction
Frozen Derm Foundation Encoder
(vs. ResNet, ViT, CLIP, etc.)

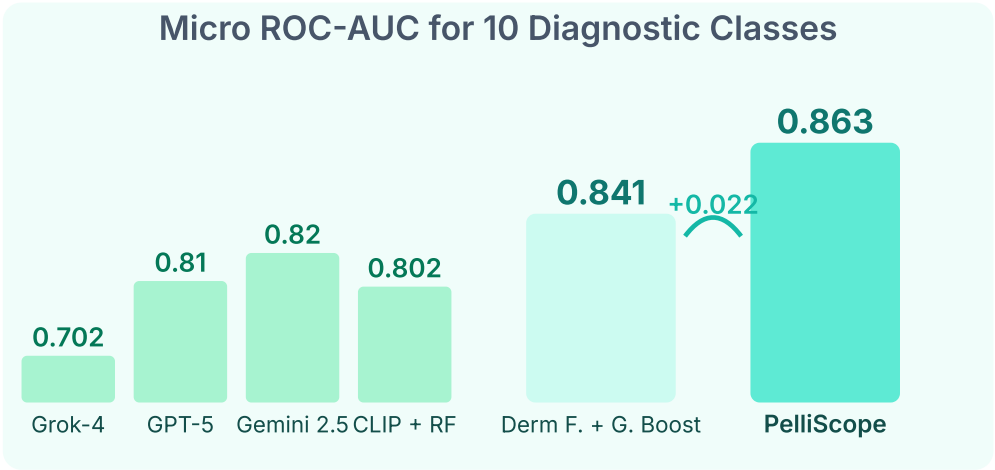
→

Step 2: Case-Level Learning
Gated-Attention MIL Head
(Trained with AdamW, cb-BCE)

→

Output
Case-Level Diagnosis
(Micro/Macro AUC)

Results: Outperforms Open & Closed Models



Conclusion: A Practical Path to Deployable AI

- ✓ **High Overall Accuracy:** Achieves mean accuracy of 0.802 on the test set.
- ✓ **Clinically Meaningful:** Tunable thresholds for specific needs.
  e.g., Urticaria: Sensitivity 0.818, Specificity 0.826
- ✓ **Efficient & Deployable:** Lightweight model on frozen features.
  ~6–7s inference on a consumer CPU

The solution is acknowledged by Emirates Health Services (UAE) to be implemented in their workflow.
(Acknowledgement Letter)