



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad



DermaCon-IN: A Multi-concept Annotated Dermatological Image Dataset of Indian Skin Disorders for Clinical AI Research

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DermaCon-IN Dataset

DermaCon-IN
sample images

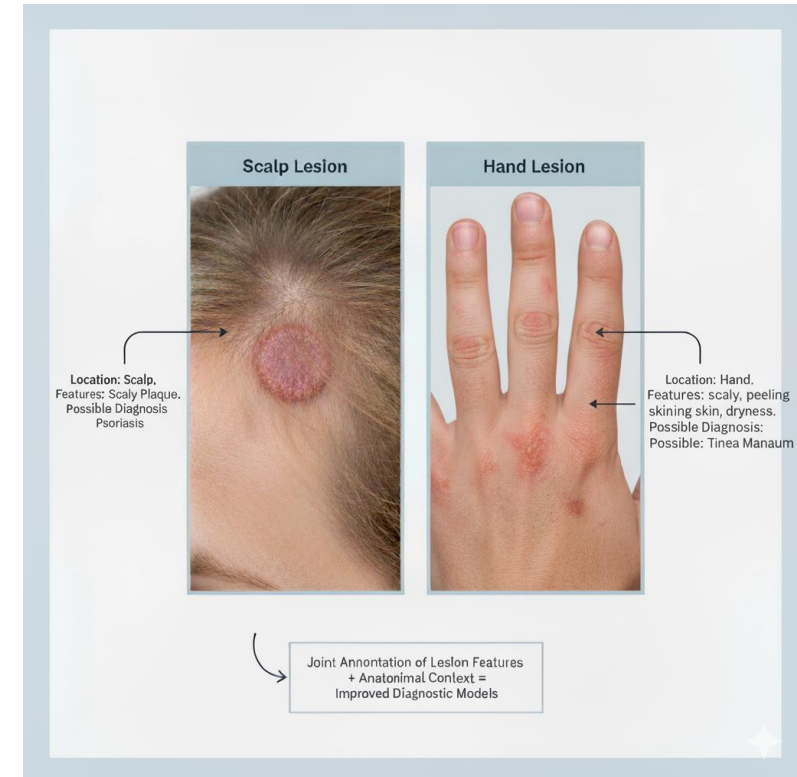


Descriptors	Patch, White (Hypopigmentation)	Fissure, Hyperkeratotic plaques, Scale	Erythema, Plaque, Scale	Erythema, Wheal	Patch, Plaque, White (Hypopigmentation)
Body Parts	Upper Extremities Hands (Manus) Fingers (Digits)	Lower Extremities Soles (Plantar Region)	Head Cheeks	Trunk Abdomen, Thorax, Upper Extremities Shoulders	Head Scalp
Main Class	Pigmentary Disorders	Keratanisation Disorders	Infectious Disorders	Inflammatory Disorders	Inflammatory Disorders
Sub Class	Pigmentary Disorders	Keratanisation Disorders	Infectious-Fungal	Inflammatory (Other)	Eczema and Dermatitis
Disease Label	Vitiligo	Palmoplantar Keratoderma	Tinea Faciei	Urticaria	Seborrheic Dermatitis

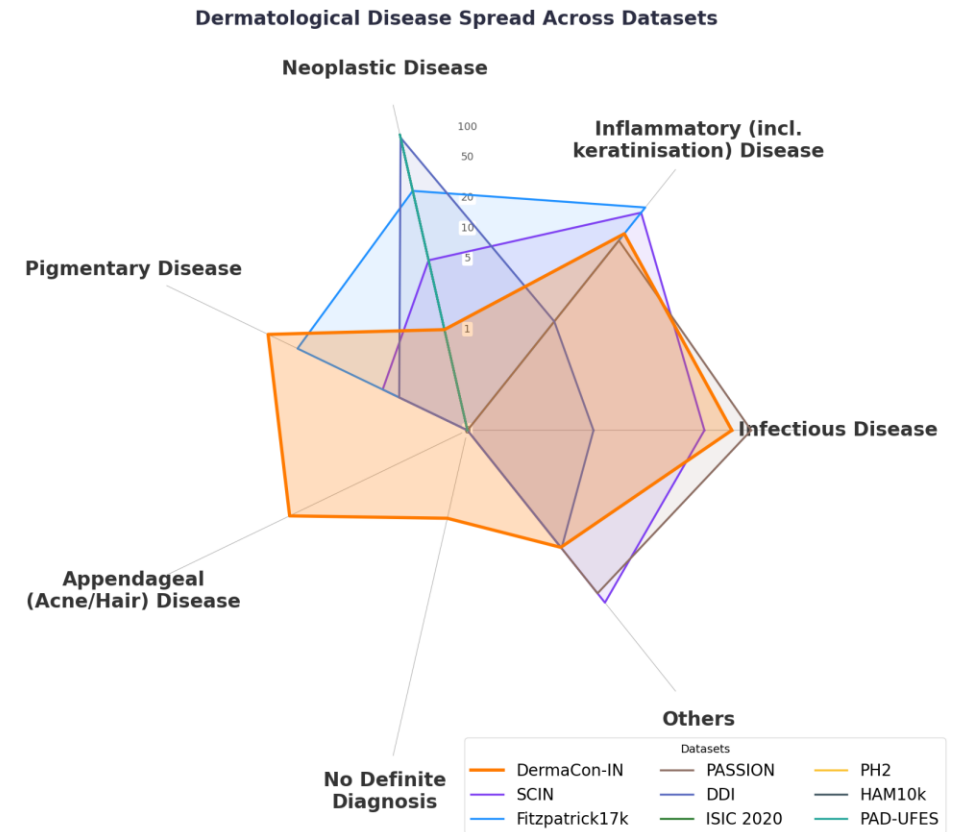
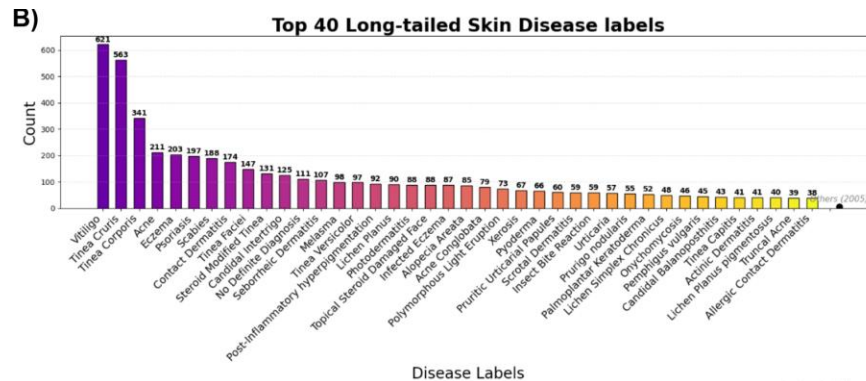
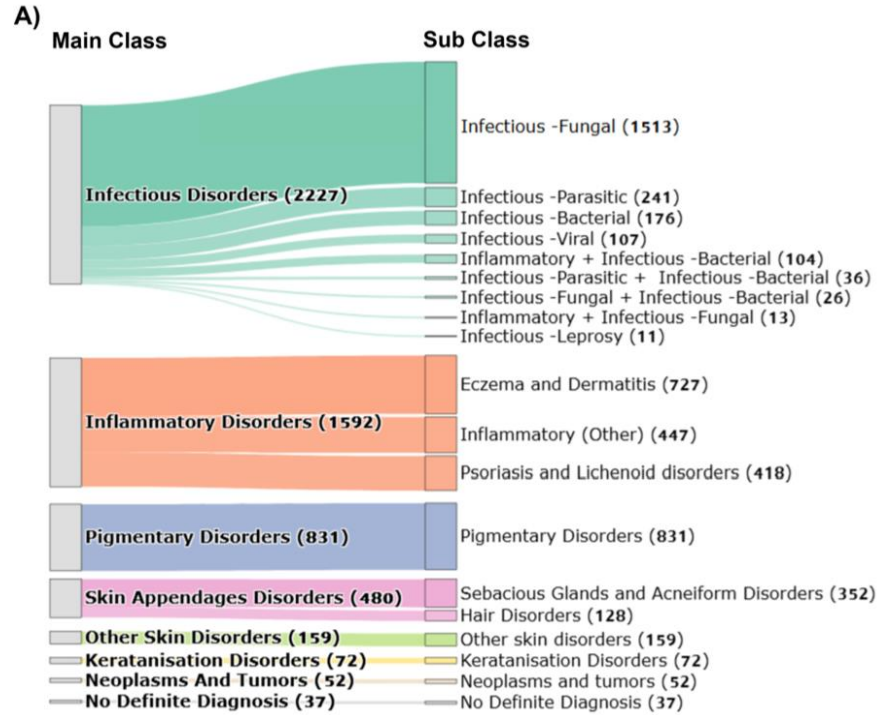
- First prospectively curated dermatology dataset
- **5,450+ clinical images** from **~3,000 South Indian patients**,
- **240+ diagnosis**
- Clinically Hierarchical labels as per **Rook's Taxonomy**
- **47 lesion-level concepts**, **49 body locations**, and **6 FST** and **10 MST** skin tone scores

Context Matters: Dermatological Diagnosis

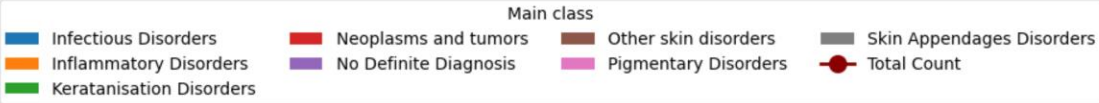
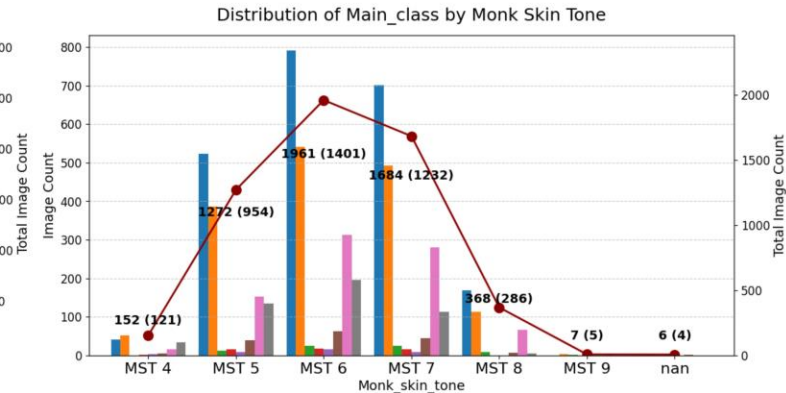
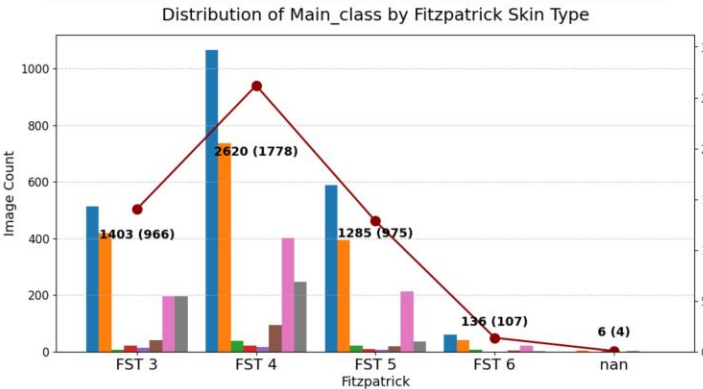
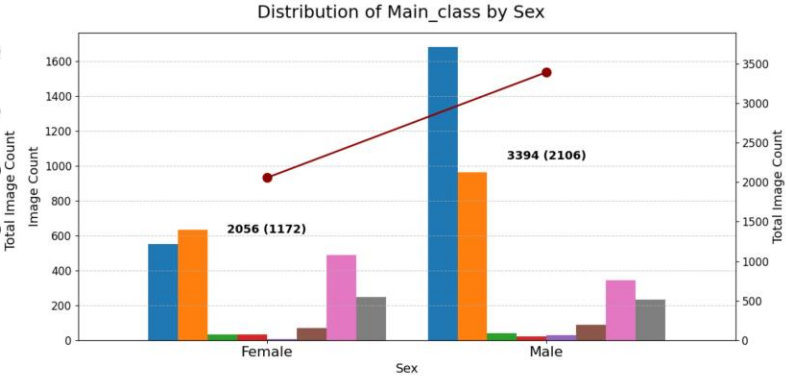
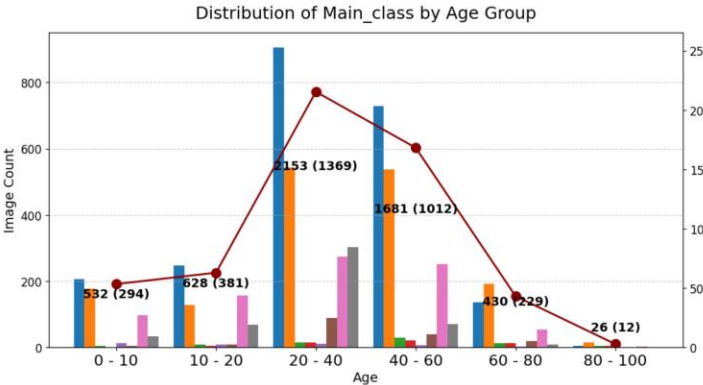
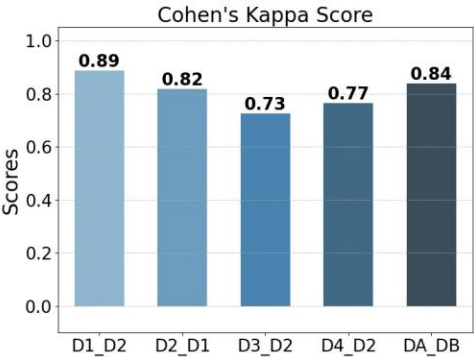
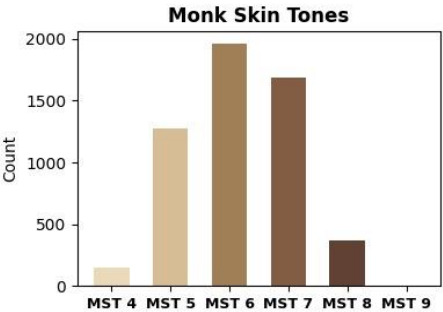
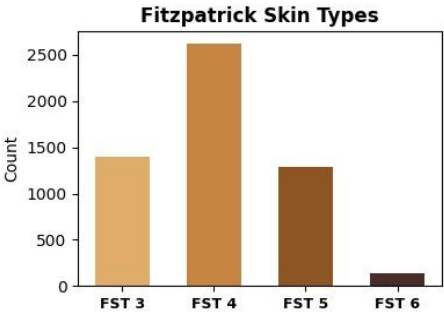
- **Location Matters in Diagnosis**
- **Scalp:** Scaly plaque → Psoriasis
- **Hand:** Scaly, peeling skin → Tinea Manuum
- **Dermatologists:** Features + Anatomy = Diagnosis
- **Better Models:** Joint Annotation = Improved Accuracy



Hierarchical Labels

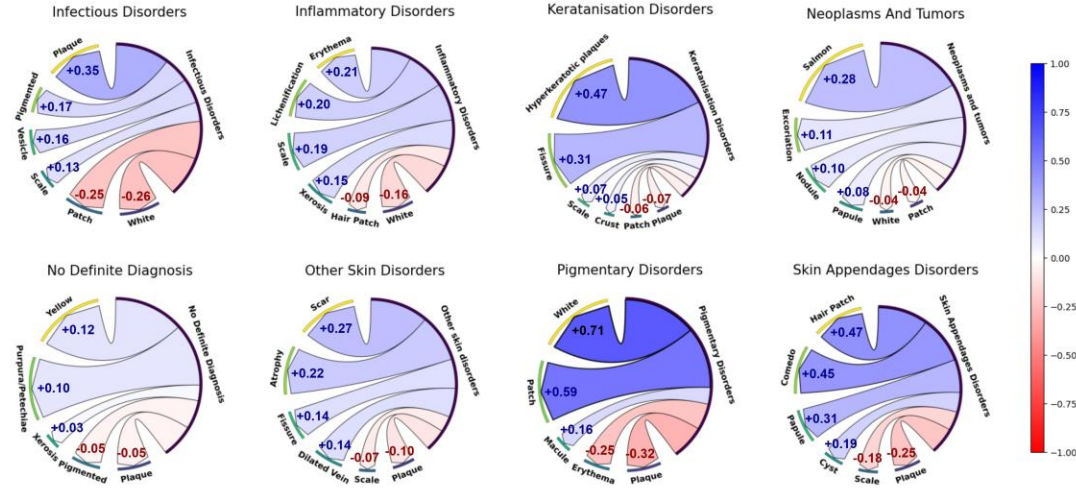


Data Statistics

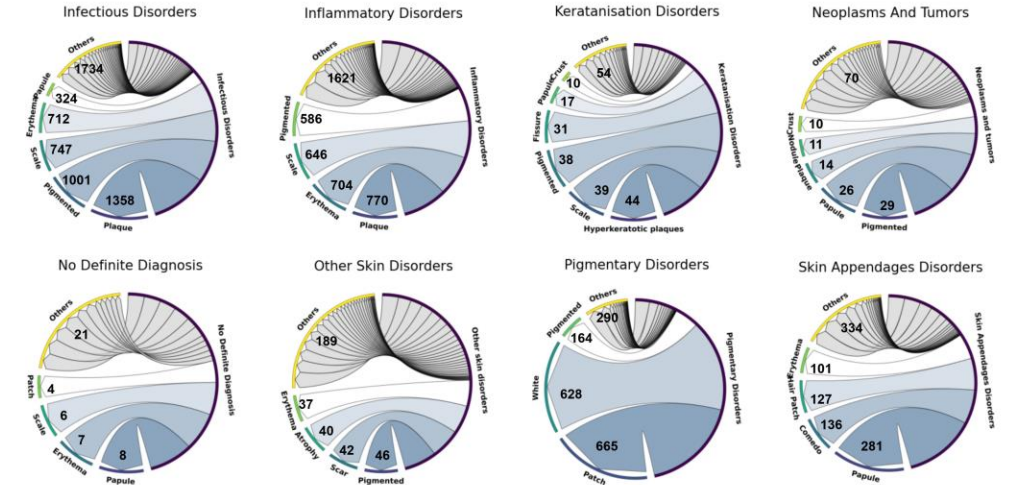


Concept Statistics

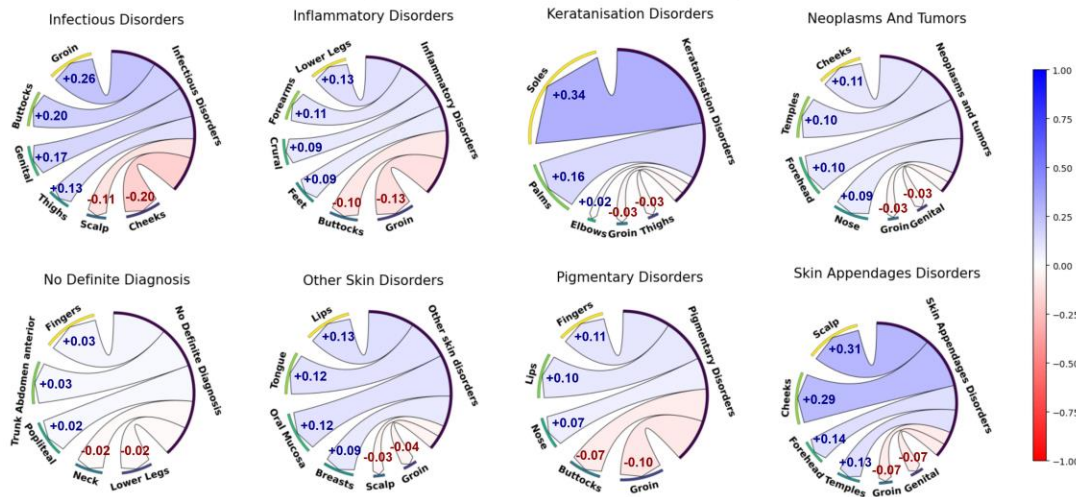
A) Correlation of Main Class labels and Disease Descriptors



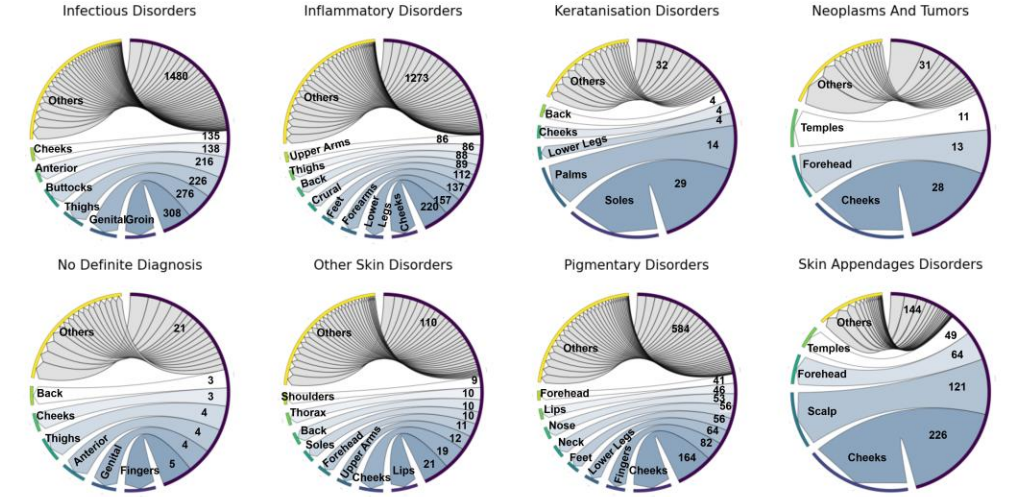
A) Count of Skin Lesion Descriptors in each Main Class



B) Correlation of Main Class labels and Body Parts

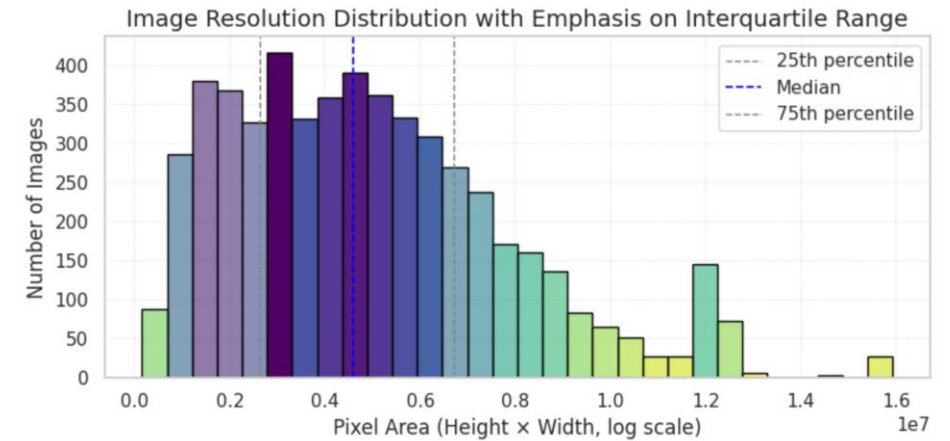


B) Count of Body parts in each Main Class



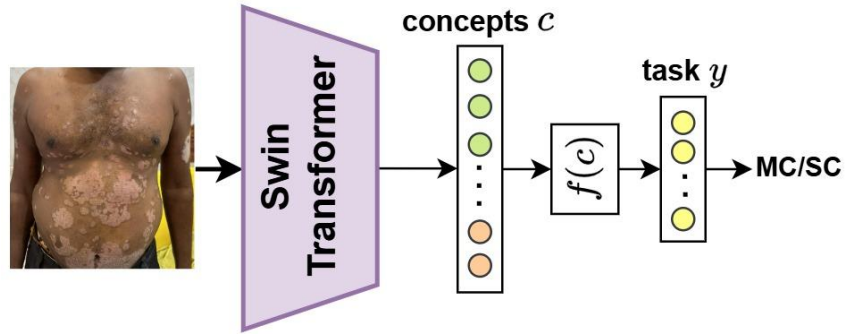
Challenges and Opportunities

- Resolution heterogeneity
- Long-tailed Disease Labels
- Class-agnostic Concept semantics
- Hierarchical Class Label
- Multi-disease co-occurrence analysis:
 - Misclassifications **collapse to one constituent disease (Either)**
 - Suggestive of one pathology's cues often dominate the visual evidence



CBM Benchmarks Architecture

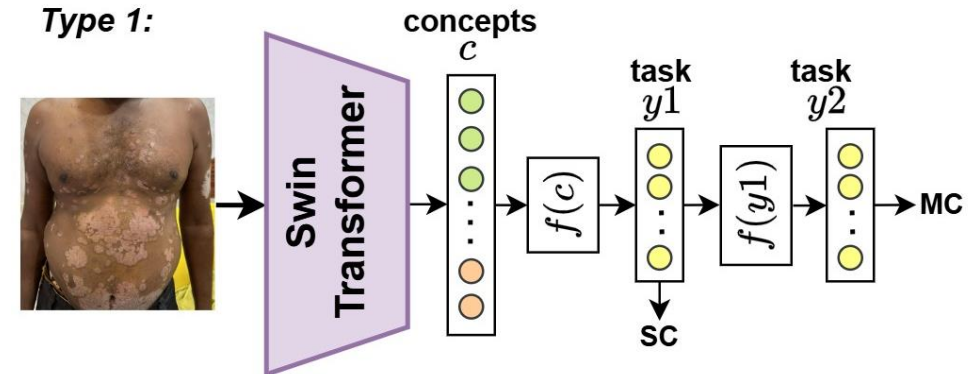
A) Concept Bottleneck Model for 1-level classification



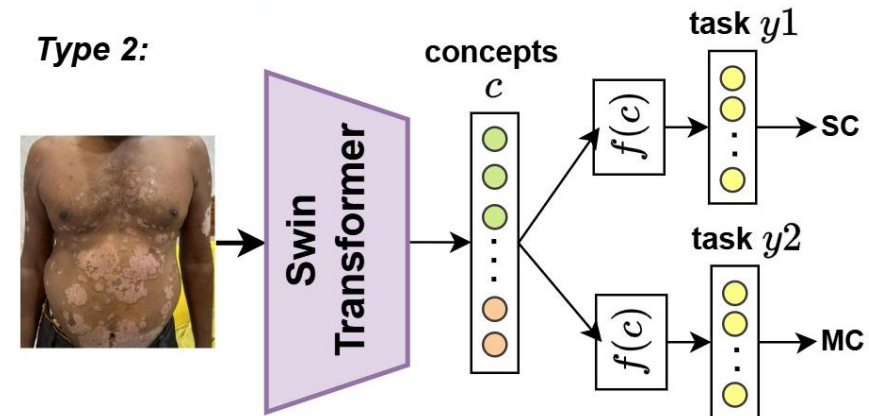
● Body part concept ● Lesion descriptor concept ● Output logits

B) Concept Bottleneck Model for 2-level hierarchical classification

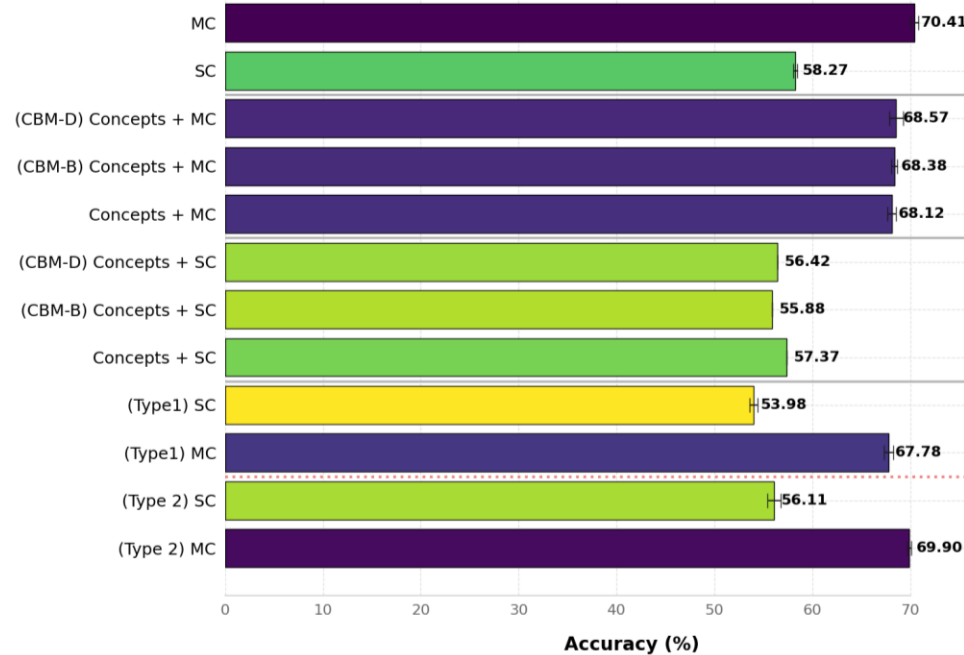
Type 1:



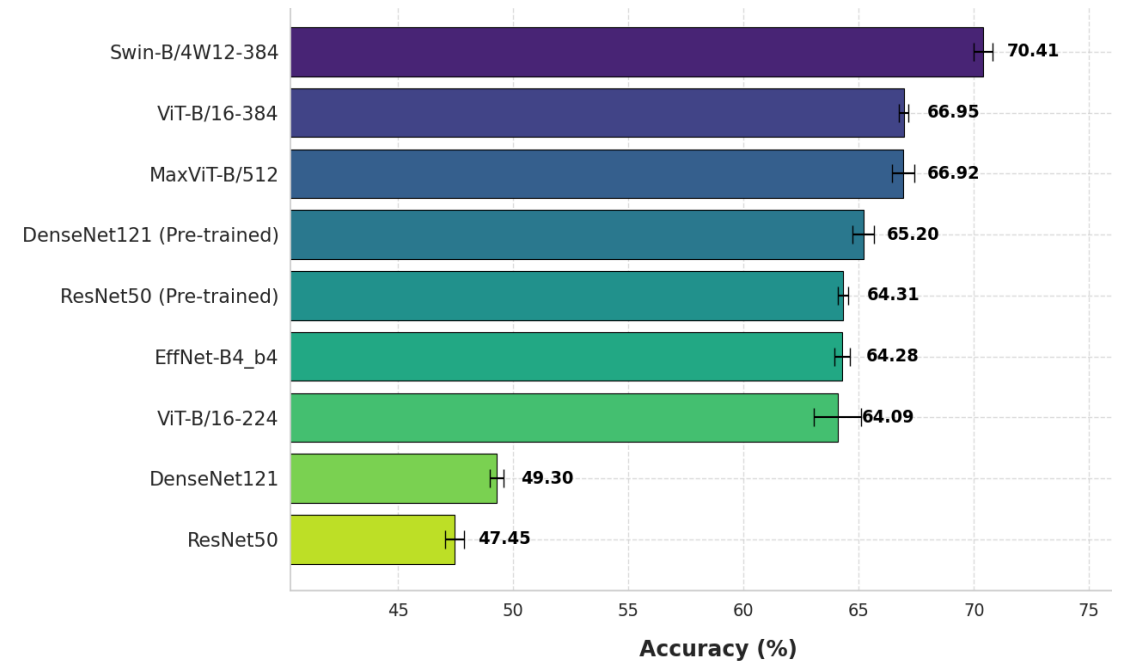
Type 2:



Comparative Results of Benchmarks with CBMs and other standard architectures

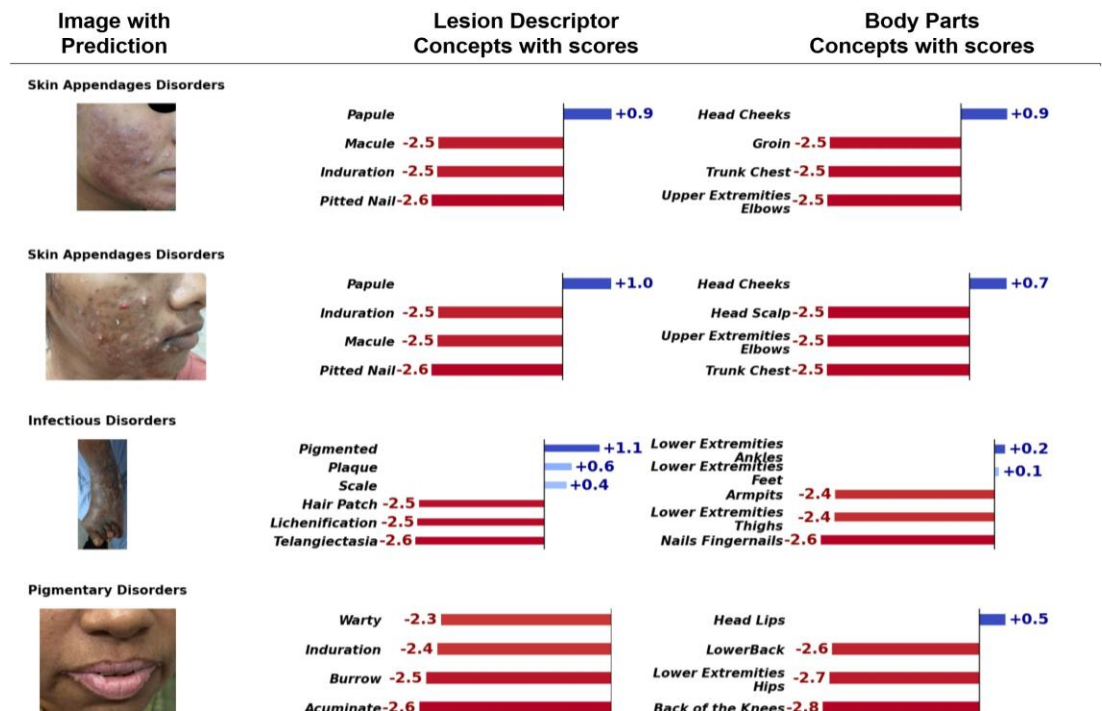
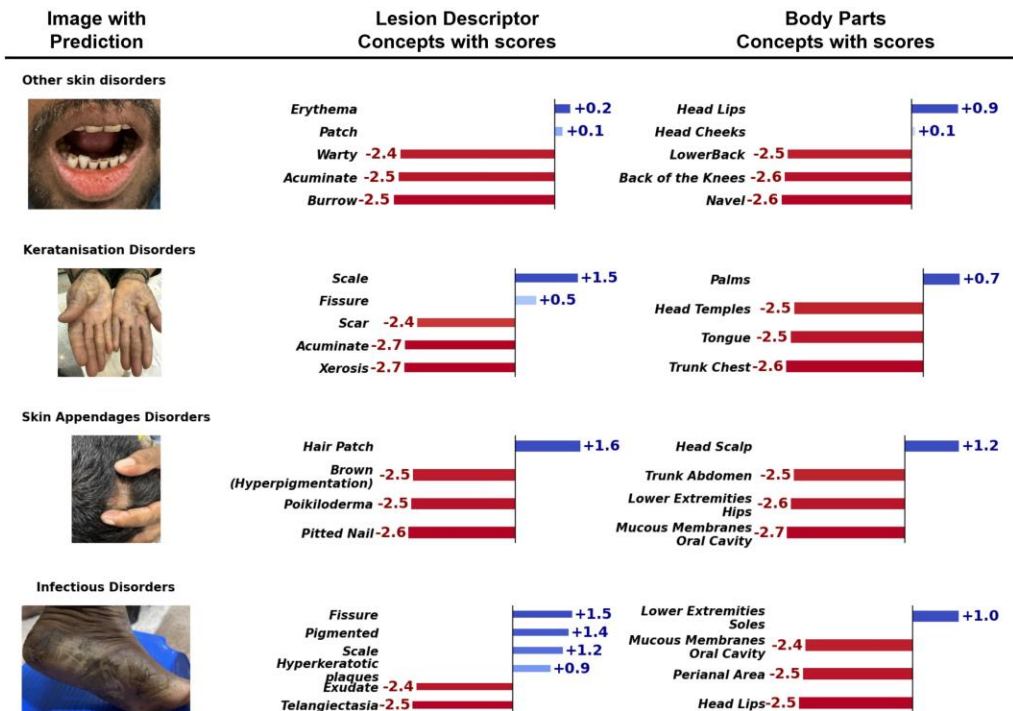


Main Class and Sub Class Classification performance comparison using Concept Bottleneck Models

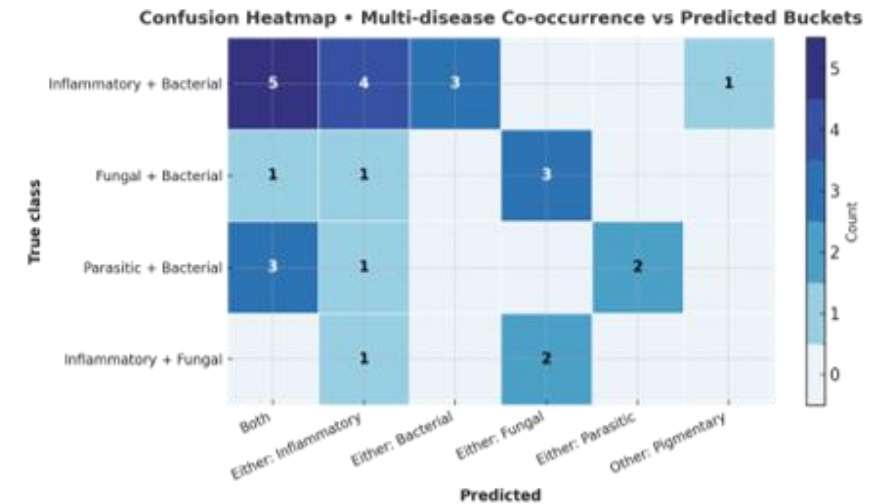
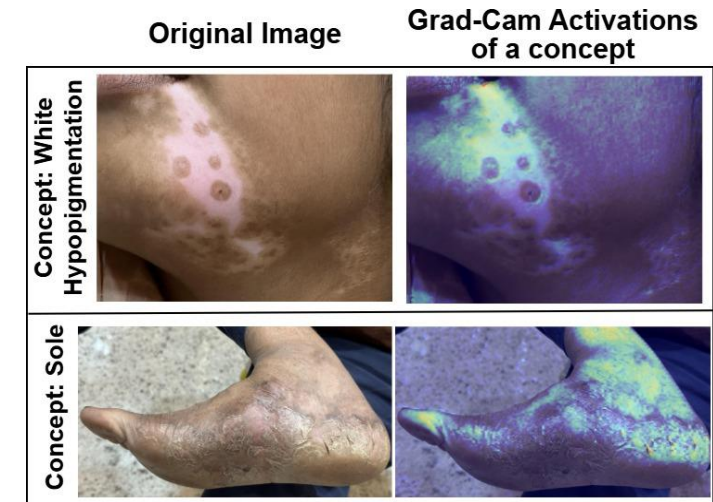
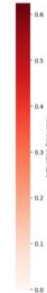
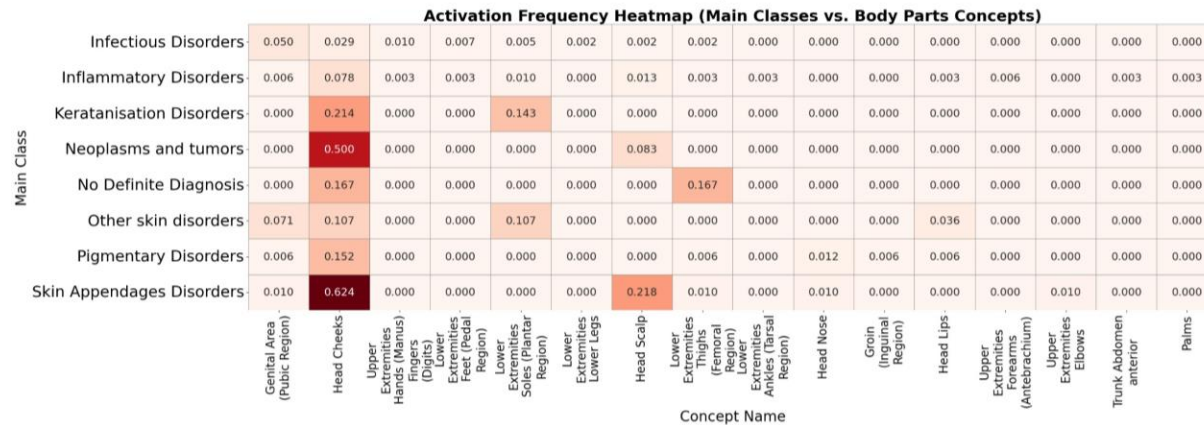
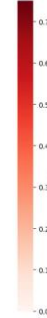
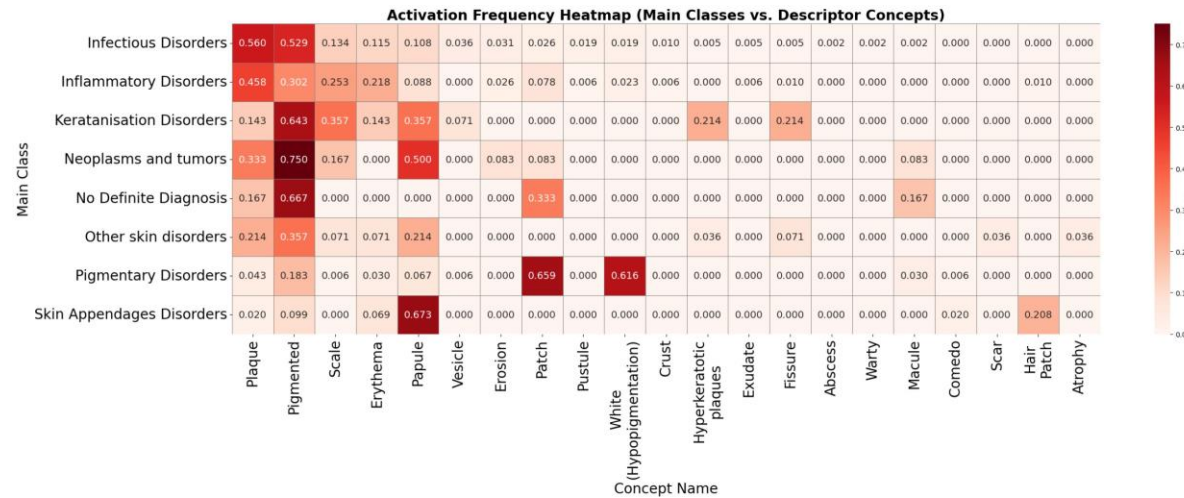


Main Class Classification performance comparison across Various Architectures

Concept Analysis



More Analysis



DermaCon-In is hosted in
Harvard Dataverse!



THANK YOU

GITHUB



CONTACT

