Melanoma Detection with Uncertainty Quantification

“We make the trustworthy diagnosis in life-or-death decisions.”

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Motivation

- AI models can make critical errors, especially in risky, ambiguous melanoma cases
- Instead of forcing a decision, it’s safer to say: “Don’t know” → Let physicians decide.

Our Approach

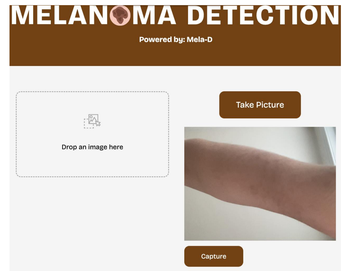
- Uncertainty-aware AI model (Uncertainty + Calibration)
  - Know when ‘not to predict’
  - Strategically remove the least trustworthy predictions by optimizing a rejection threshold
- Find which classifier + dataset combination is optimal

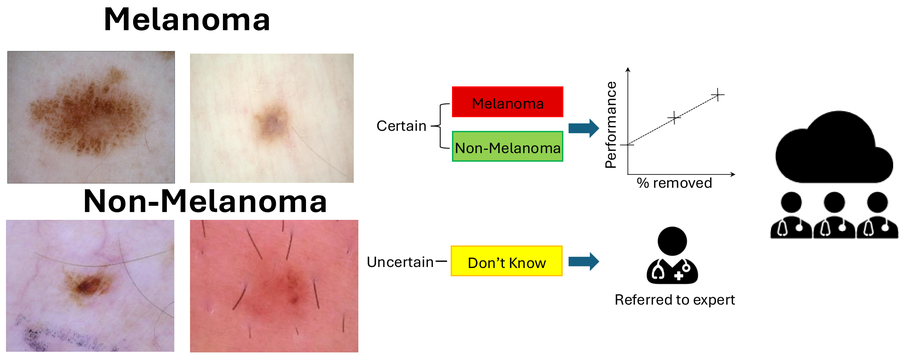
Contribution

- 10+ public datasets + comparing 30+ classifiers: up to 97% accuracy
- Uncertainty + Calibration: Misdiagnoses ↓ by over 40%

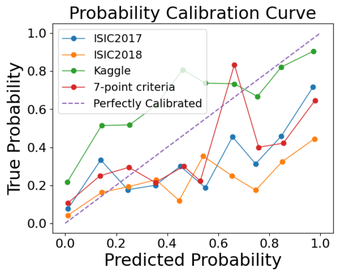
Web Deployment

- No server needed (edge computing)
  - All inference runs within the browser.
- Runs on any device in seconds with uncertainty/risk estimation



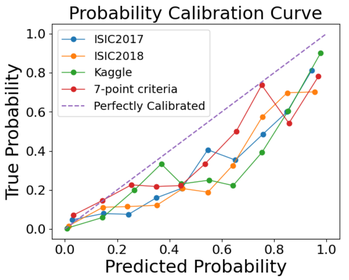


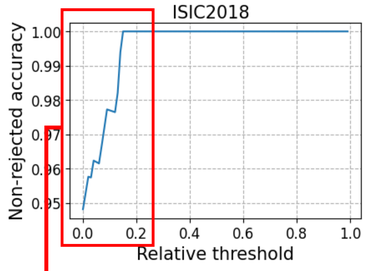
Uncalibrated (loss: 0.8)



Dynamic Rejection based on Calibration

Calibrated (loss: 0.2)





Dynamically find the reliable point within the rejection scope