



Figure 6: Relationship between conformal uncertainty and two epistemic uncertainty measures at  $\alpha = 0.1$ ; colors correspond to different Fitzpatrick skin types;  $\times$  denotes a malignant skin condition and  $\circ$  denotes a non-malignant skin condition.

|         | <b>method</b> | 0.1  | 0.2  | 0.3  | 0.4  | 0.5  |
|---------|---------------|------|------|------|------|------|
| softmax | NAIVE         | 0.71 | 0.75 | 0.78 | 0.75 | 0.55 |
|         | APS           | 0.69 | 0.72 | 0.75 | 0.78 | 0.82 |
|         | RAPS          | 0.69 | 0.73 | 0.75 | 0.79 | 0.82 |
|         | GAPS          | 0.66 | 0.70 | 0.74 | 0.76 | 0.80 |
|         | GRAPS         | 0.66 | 0.70 | 0.74 | 0.76 | 0.80 |
| entropy | NAIVE         | 0.82 | 0.84 | 0.80 | 0.66 | 0.34 |
|         | APS           | 0.81 | 0.83 | 0.85 | 0.87 | 0.87 |
|         | RAPS          | 0.81 | 0.84 | 0.85 | 0.87 | 0.87 |
|         | GAPS          | 0.77 | 0.81 | 0.84 | 0.84 | 0.86 |
|         | GRAPS         | 0.77 | 0.81 | 0.84 | 0.84 | 0.86 |

Table 4: Spearman correlation between set size and epistemic uncertainty (maximum softmax probability and predictive entropy) at five different values of  $\alpha$ .

and darkest skin tones. Therefore, we conclude that group conformal methods can better describe subgroup uncertainty than regular conformal methods when subgroups come from different data distributions.

## Conclusion

Fair conformal predictors have the potential to increase clinician trust in AI models by providing meaningful notions of uncertainty across clinically relevant sub-populations. These distribution-free methods complement existing deep learning models and require no modifications to existing training procedures. Based on our experiments, we find group conformal predictors to be a promising and generally applicable approach to increasing clinical usability and trustworthiness in medical AI. We hope this work promotes further work into group conformal predictors for clinical applications in healthcare.

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