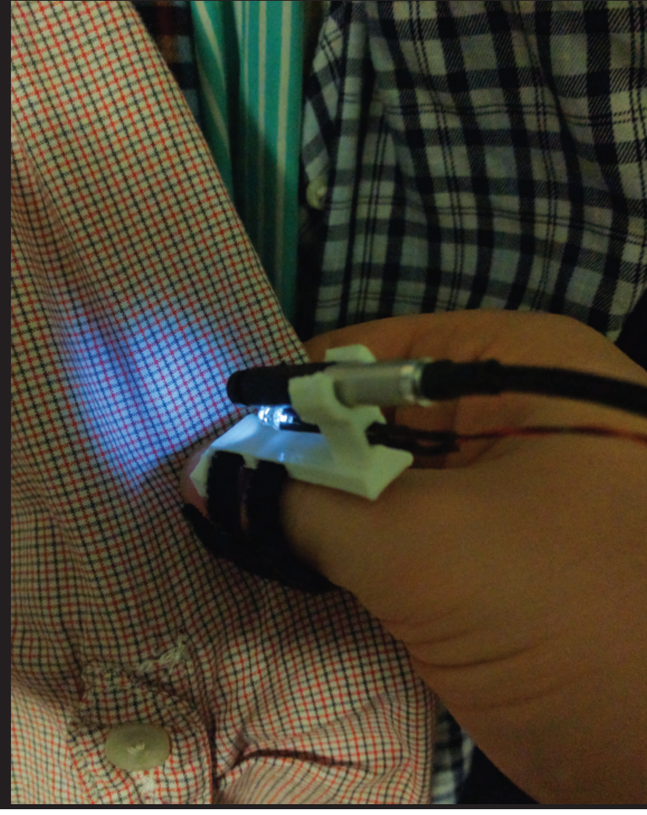
Recognizing Clothing Colors and Visual Textures Using a Finger-Mounted Camera: An Initial Investigation



Motivation

We investigate clothing **color** and **visual texture** recognition using images from a **finger-worn camera** to support people with **visual impairments**.

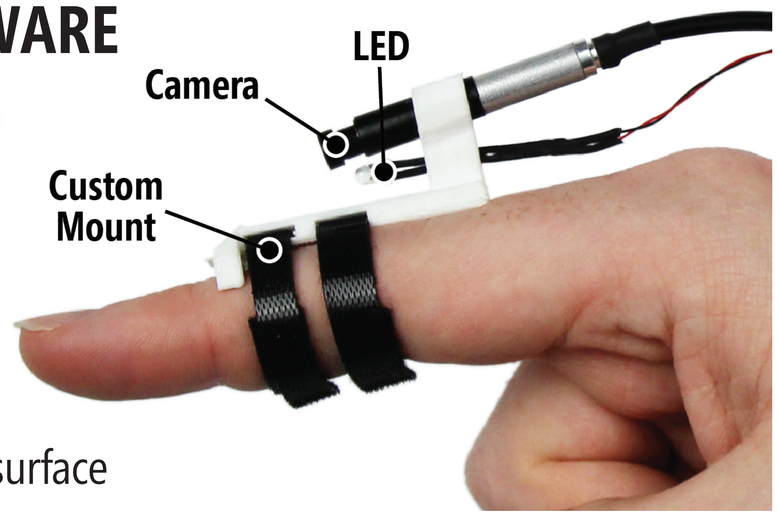
Our approach mitigates issues with **distance** and **lighting** that can impact the accuracy of existing color and texture recognizers and allows for easy **touch-based interrogation** to better understand clothing appearance.

Prototype Hardware

Awaiba NanEye Idule Camera
640×640px, 30° FoV

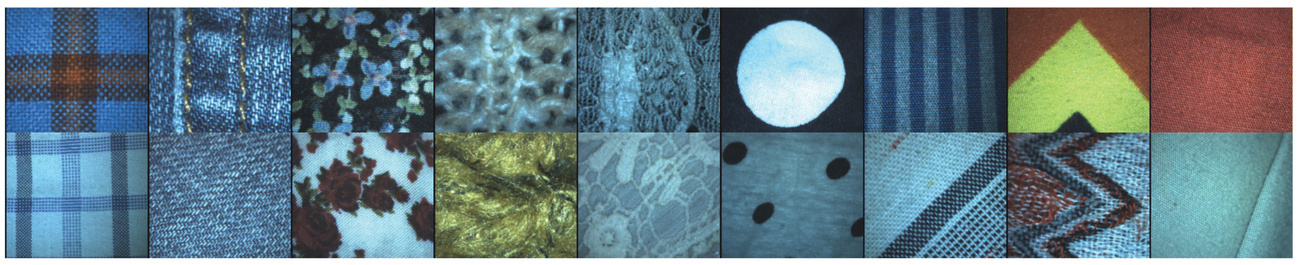
Bright LED
Ensures consistent lighting

Custom Mount
Positions camera above finger to capture images of touched surface



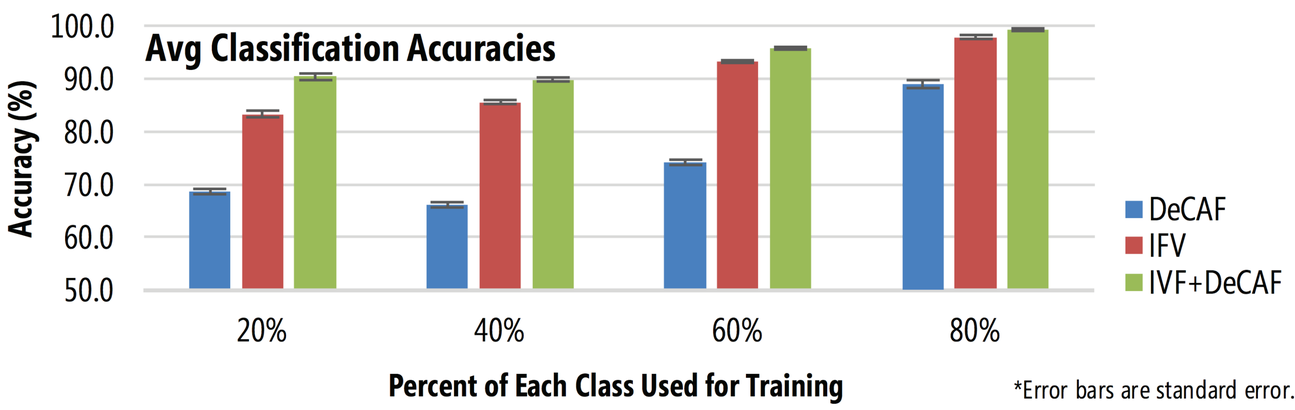
Dataset and Experiments

We collected 520 images across 29 articles of clothing and 9 texture categories.



Checkered (88) | Denim (40) | Floral (88) | Knitted (32) | Lacelike (48) | Polka-dotted (48) | Striped (64) | Zigzagged (64) | None (64)

To assess performance, we computed classification accuracy using DeCAF and IFV features separately and together as the training set size increases.



*Error bars are standard error.

Visual Texture Recognition

We apply the approach in Cimpoi, et al., 2012, combining two **complementary features** to improve classification performance.

1. Deep convolutional activation features (DeCAF) use the AlexNet image classification network to represent texture by removing the last two softmax and fully connected layers.

2. Scale-invariant feature transform (SIFT) descriptors are extracted densely at multiple scales. The descriptors are then combined into a single **Improved Fisher Vector (IFV)**.

Color Recognition

Touch-based interactions **limit the distance** from the target surface, and the bright LED **overpowers ambient lighting** for more consistent color recognition.

Colors are segmented into **superpixels**, allowing multiple colors to be detected simultaneously and helping users to better understand the clothing's appearance.

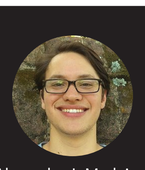
Open Questions and Future Work

These results show that we can accurately recognize clothing textures using **close-up images from a finger-mounted camera** even with minimal training data.

Future work should investigate a much **larger, more varied dataset** and conduct a user study with a **realtime system**.

Our approach should allow users to combine their **sense of touch** with **color and texture feedback** to make more informed decisions about what to buy or wear. How best to **convey this information** to users is an open question.

MAKEABILITY LAB
inclusive design lab
HCIL
Poolesville High School
University of Maryland
University of Washington


Alexander J. Medeiros
UMD


Lee Stearns
UMD


Leah Findlater
UMD | UW


Chuan Chen
Poolesville HS


Jon E. Froehlich
UMD | UW