

Topic:

- Facial recognition has gotten faster, cheaper, and more accurate in recent years. What are the ethical implications of companies using this technology and their security systems to track consumer activity? Specifically, how could racial biases contained in facial recognition models create ethical problems when the technology is implemented?
- Research side: Redo (ish) previous iterations of facial recognition racial bias studies. Compare and contrast results; are the differences concerning?

Project Materials:

- Research Paper
- Dataset: <https://github.com/dchen236/FairFace>
- Data analysis on 3 different open-source facial recognition models
 - OpenCV with Haar Cascades
 - What it outputs:** Face detection (bounding boxes around faces) with confidence scores
 - Bias test:** Compare detection rates across racial groups
 - Does it fail to detect certain racial groups more often?
 - Are confidence scores consistently lower for certain demographics?
 - Does it require different lighting conditions to detect different skin tones?
 - DeepFace <https://github.com/serengil/deepface>
 - What it outputs:** Face verification + demographic analysis (including race classification)
 - Bias tests:**
 - Race classification accuracy: Does it correctly identify race across all groups?
 - Verification accuracy: Does it struggle to match/distinguish between faces of certain races?
 - Confidence scores: Are they consistently lower for certain demographics?
 - Face_recognition library (dlib-based)
https://github.com/ageitgey/face_recognition
 - What it outputs:** Face encodings (128-dimensional vectors representing facial features)
 - Bias tests:**
 - Face matching accuracy: Create pairs of images (same person, different images) across racial groups
 - Calculate false match/non-match rates by race
 - Compare face distance thresholds needed for accurate matching across groups
 - Test if it requires tighter thresholds for certain racial groups to achieve the same accuracy