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DS4002

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## **A Case Study of Facial Recognition Models and their Efficacy**

Biometrics, especially facial recognition technologies, have become ubiquitous tools that are employed for a wide variety of purposes, from facilitating daily operations to enhancing public safety. Apple has been implementing Face ID technology for several years as a form of security on personal devices. It has also been applied in marketing, allowing companies to rapidly change advertisements based on the physical appearance of the consumer, making assumptions about their emotions and preferences [1]. In regard to law enforcement, police agencies use facial recognition to compare mugshots of arrestees to databases across jurisdictions as a way to identify individuals and link them to other incidents [2].

However, recent studies reveal significant racial and gender-based biases that are built into these models [3]. Average error rates for lighter-skinned men remain below 1%, as compared to a much larger 35% for darker-skinned women [4]. Overall, they perform very well for white, middle-aged men while only being moderately accurate for women, children, and the elderly. While these technologies have the capability to be extremely useful, the bias present in these models can cause significant harm and exacerbate existing social disparities. The overall goal of this case study is to build a facial recognition model to identify celebrities based upon training images. The results of the training process will be further analyzed to determine what bias may be present within the model and how it has the potential to be discriminatory.

### **The Deliverable:**

In this assignment, you will use the provided images of 25 different celebrities to create a facial recognition model using Keras in Python. Alternatively, you can select your own celebrities of interest and gather 100 images of each individual to establish your own dataset. Starter scripts have been provided in the GitHub repository that can be modified to accomplish this task. You will submit your own GitHub repository containing the finalized code for your model, the data and images used, as well as a one page written summary of your results, learnings, and takeaways from the project.

**GitHub Link:** <https://github.com/gkbrasselle/DS4002CS3>

**References:**

- [1] “Facial Recognition Advertising for Better Targeting,” Business News Daily. Accessed: Dec. 05, 2024. [Online]. Available: <https://www.businessnewsdaily.com/15213-walgreens-facial-recognition.html>
- [2] “‘We try to use it as much as we can’: How facial recognition became a routine policing tool in America,” NBC News. Accessed: Dec. 05, 2024. [Online]. Available: <https://www.nbcnews.com/news/us-news/how-facial-recognition-became-routine-policing-tool-america-n1004251>
- [3] SITNFlash, “Racial Discrimination in Face Recognition Technology,” Science in the News. Accessed: Dec. 05, 2024. [Online]. Available: <https://sitn.hms.harvard.edu/flash/2020/racial-discrimination-in-face-recognition-technology/>
- [4] “Biased Technology: The Automated Discrimination of Facial Recognition | ACLU of Minnesota.” Accessed: Dec. 05, 2024. [Online]. Available: <https://www.aclu-mn.org/en/news/biased-technology-automated-discrimination-facial-recognition>