UVA DATA SCIENCE

Bias Evaluation in Open Model Platform

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Presentation roadmap

- Background/purpose
- Data: source, assumptions, limitations
- Methods
- Findings
- Future work

Background

Sponsor background

- Research was conducted on behalf of Intel Labs for their Open Model Zoo Software
- OpenVINO Toolkit and Open Model Zoo are a set of open source AI Tools for public use

Purpose

- Evaluate various Bias Mitigation Techniques
- Identify a dataset to apply bias mitigation on an Open Model Zoo model

Data

FairFace Data

- Originally from the YFCC-100M Flickr
- 108,501 curated, balanced images
- Data Attributes:
  - Race, gender, and age groups
  - 7 Race groups: White, Black, Indian, East Asian, Southeast Asian, Middle Eastern, and Latino

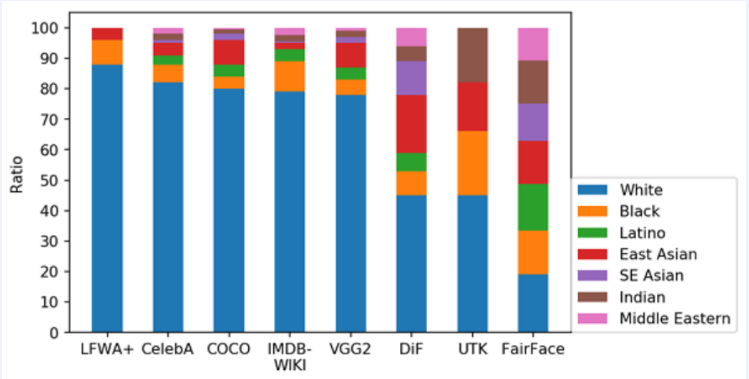

Fig 1. Racial compositions in face datasets

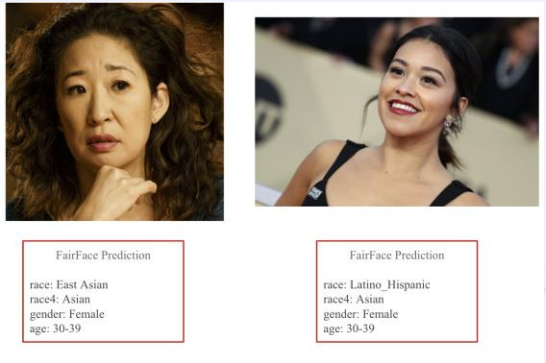

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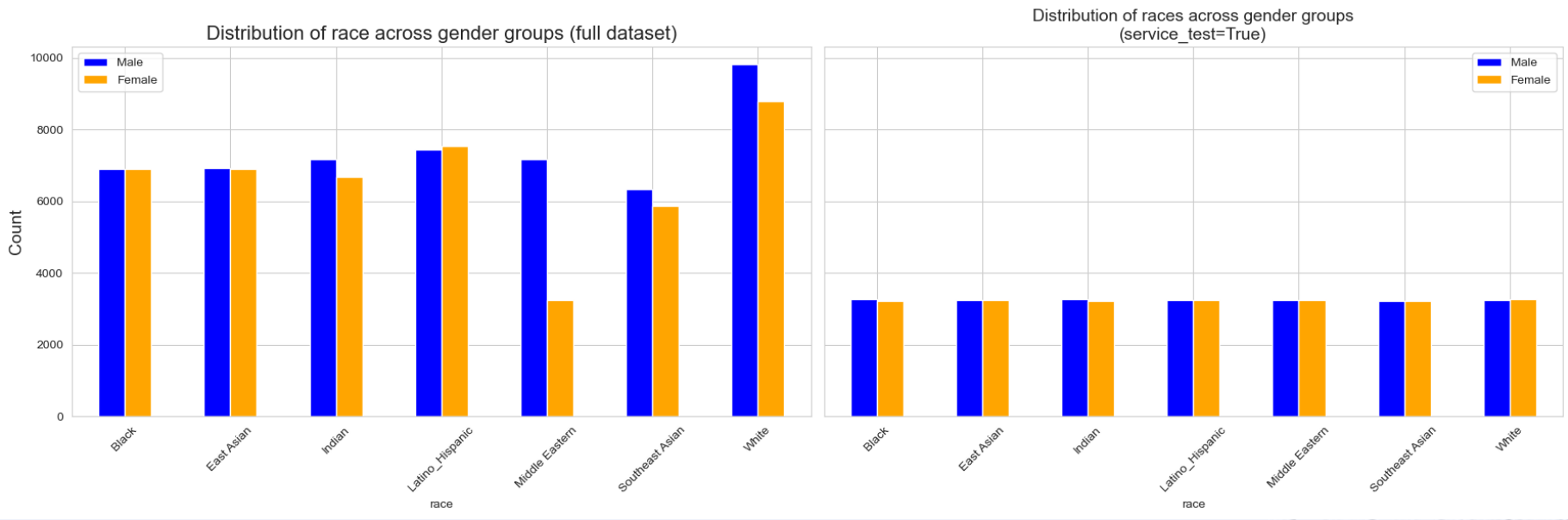
Fig 1. Racial compositions in face datasets, Joo, et al (2021)

FairFace Data

- Service Test:
  - Amazon, Microsoft, Facebook, IBM tested FairFace for classification accuracy
  - Evaluated dataset: 40,252
- Challenges:
  - Representation does not guarantee fairness # ie. approvals
  - Intersectionality underrepresentation # ie. A few Indian women

FairFace Data



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Methods

Methodology

- Inputs as Batch Size, number of channels, image height, image width
- Face-Detection-0200
- Uses MobilenetV2 (CNN) architecture
- Output blob that contains predicted number of bounding boxes and confidence values

Findings

Top findings with Aequitas

- Dataset: FairFace (diverse gender, race, age)
- Tool: Aequitas Bias Metrics
- Thresholds evaluated:
  - 95% (strict)
  - 80% (general detection standard)

Top findings with Aequitas (Continued)

- At 95% threshold:
  - Missed faces more often for older adults and Black individuals
  - Southeast Asian, Latino/Hispanic, and children had better detection
- At 80% threshold:
  - Detection improved for all groups
  - Fairness gaps shrank significantly

Future work

Future work plan

- Dataset with non-faces
- AI Fairness 360 (AIF360)
- Explanations of each metric
- Qualitative bias analysis

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Questions?

Capstone Team

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