

Automatically quantifying gender bias in movies via image analysis

October 17 2019

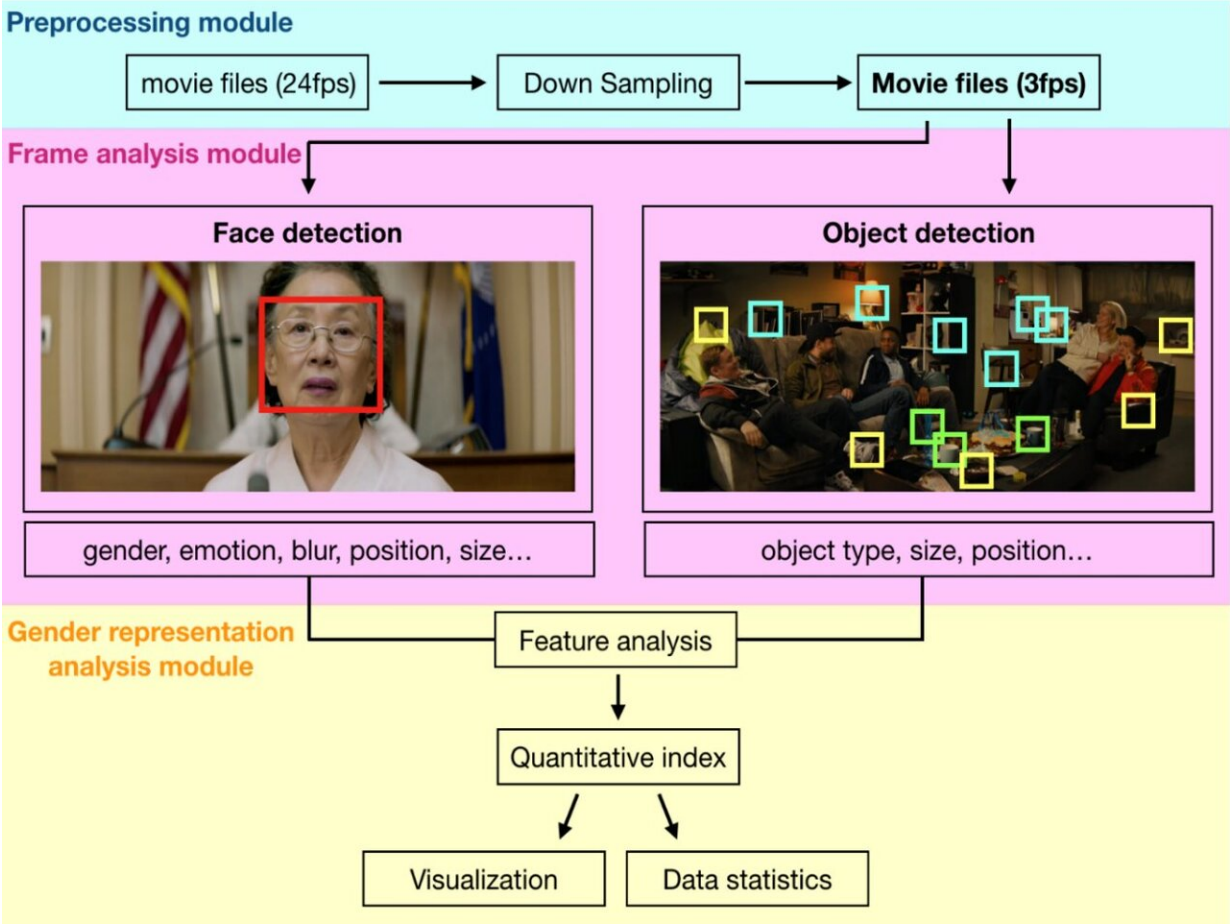


Figure 1. System Diagram. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

Many commercial films worldwide continue to express womanhood in a stereotypical manner, a recent study using image analysis showed. A KAIST research team developed a novel image analysis method for automatically quantifying the degree of gender bias in in films.

The Bechdel Test has been the most representative and general method of evaluating gender [bias](#) in [films](#). This test indicates the degree of gender bias in a film by measuring how active the presence of women is in a film. A film passes the Bechdel Test if the film (1) has at least two [female characters](#), (2) who talk to each other, and (3) their conversation is not related to the male characters.

However, the Bechdel Test has fundamental limitations regarding the accuracy and practicality of the evaluation. Firstly, the Bechdel Test requires considerable human resources, as it is performed subjectively by a person. More importantly, the Bechdel Test analyzes only a single aspect of the film, the dialogs between characters in the script, and provides only a dichotomous result of passing the [test](#), neglecting the fact that a film is a visual art form reflecting multi-layered and complicated gender bias phenomena. It is also difficult to fully represent today's various discourse on gender bias, which is much more diverse than in 1985 when the Bechdel Test was first presented.



Figure 2. 40 Hollywood and Korean films analyzed in the study. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

Inspired by these limitations, a KAIST research team led by Professor Byungjoo Lee from the Graduate School of Culture Technology proposed an advanced system that uses computer vision technology to automatically analyzes the visual information of each frame of the film. This allows the system to more accurately and practically evaluate the degree to which female and male characters are discriminatingly depicted in a film in quantitative terms, and further enables the revealing of [gender bias](#) that conventional analysis methods could not yet detect.

Professor Lee and his researchers Ji Yoon Jang and Sangyoon Lee

analyzed 40 films from Hollywood and South Korea released between 2017 and 2018. They downsampled the films from 24 to 3 frames per second, and used Microsoft's Face API facial recognition technology and object detection technology YOLO9000 to verify the details of the characters and their surrounding objects in the scenes.

Using the new system, the team computed eight quantitative indices that describe the representation of a particular [gender](#) in the films. They are: emotional diversity, spatial staticity, spatial occupancy, temporal occupancy, mean age, intellectual image, emphasis on appearance, and type and frequency of surrounding objects.

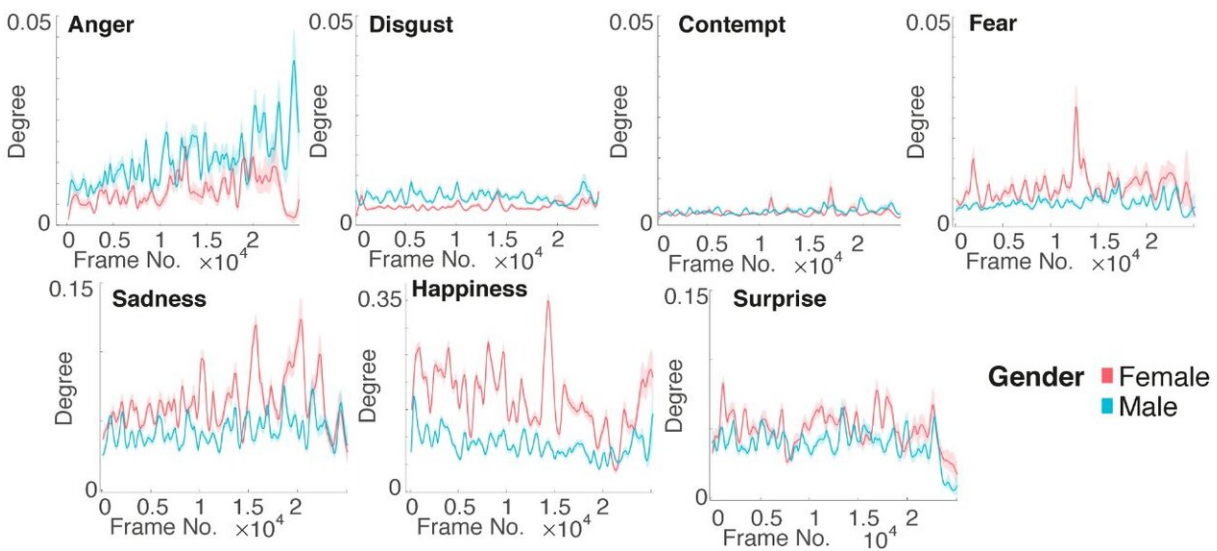


Figure 3. Difference in emotional diversity between female and male characters. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

The type and frequency of surrounding objects index revealed that female characters and automobiles were tracked together only 55.7 percent as much as that of [male characters](#), while they were more likely

to appear with furniture and in a household, with 123.9 percent probability.

In cases of temporal occupancy and mean age, female characters appeared less frequently in films than males at the rate of 56 percent, and were on average younger in 79.1 percent of the cases. These two indices were especially conspicuous in Korean films.

Professor Lee said, "Our research confirmed that many commercial films depict women from a stereotypical perspective. I hope this result promotes public awareness of the importance of taking prudence when filmmakers create characters in films."

More information: Quantification of Gender Representation Bias in Commercial Films based on Image Analysis. In Proceedings of the 22nd ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). ACM, New York, NY, USA, Article 198, 29 pages. doi.org/10.1145/3359300

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Provided by The Korea Advanced Institute of Science and Technology (KAIST)

Citation: Automatically quantifying gender bias in movies via image analysis (2019, October 17) retrieved 18 April 2024 from

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