Image Processing: Identifying Age and Gender

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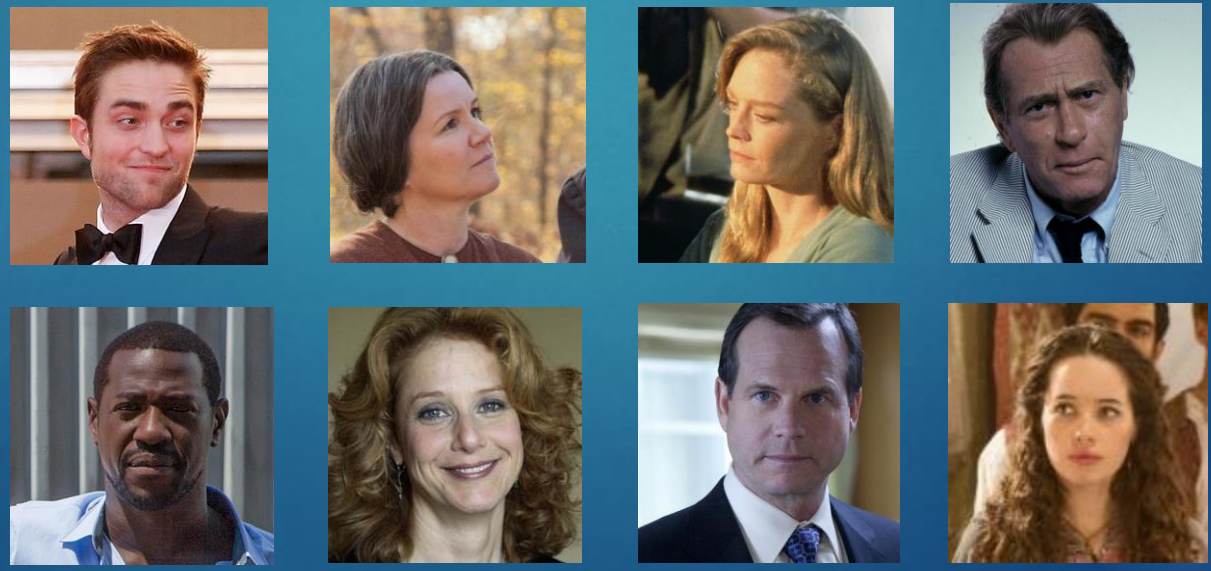
Project Motivations & Key Aims

- Facial recognition is a very commonly used technique that can be found in all sorts of areas like unlocking your phone, identifying people in Facebook pictures, finding missing persons, and so on.
- The possibilities for facial recognition with neural networks are vast, so it is a big area of interest in modern day technology.
- Our group wanted to unpack some of the mysteries of facial recognition and build neural networks that would be able to identify the age group and gender of a person from a single image of their face.
- While our project certainly didn't reach the level of intricacy that some facial recognition networks have, it reached a reasonably effective level of accuracy and is relatively easy to reproduce by individuals.

Data Set

- The IMDb-WIKI data set consists of hundreds of thousands of pictures of people web scraped from the internet. Each image is tagged with meta data including the date the picture was taken, the individual's birthday (we used these two statistics to determine the individual's age), their gender, the coordinates of their face in the image, etc.
- Here are a few example of images found in the data set.



Methods

- We decided to calculate the gender and the age group of each person rather than their specific age from 0-130 in groups of 5 (i.e. 0-4, 5-9, 10-14 …)
- Before training, the data set of images had to be preprocessed. The images were cropped to just show the individual's face to eliminate any outside factors that could sway or mislead the model. Corrupt images were also removed from the data set (some images were labelled incorrectly or did not have a face at all)
- We built two networks in the end—one to identify gender and one to identify age.
- We utilized transfer learning and built both our networks on top of the Xception model network. This was not our original plan, but this method yielded the best accuracy in the end.

Methods

- After the base, our models consisted of a global average pooling layer in order to take the average of each feature map of an image. After that we had a dense layer with 128 units with the ReLU activation function. Lastly, we had another dense layer that was the size of the output with the softmax activation function to help deal effectively with the classification problem. We compiled our model with the Adam optimizer and categorical cross entropy. We used categorical accuracy as the metric of the model.
- Both networks were then trained on around 360,000 images. To make this easier, the images were divided into groups of 40,000. The convolution net was trained with each group and the weights and history was saved periodically to keep track of the progress and accuracy. Each group of 40,000 images was used to train the model in batches of 40 with a validation split of 0.2.
- The gender model reached 82% accuracy.
- The age group model reached 31% accuracy.

Group Contributions – Rober

- One of the lead programmers
- Worked on demo
- Contributed to presentation

Group Contributions – Gloria

- Gathered references from prior research
- Major contributor to project paper
- Contributed to presentation

Group Contributions – Jessica

- Gathered references from prior research
- Major contributor to project paper
- Contributed to presentation

Group Contributions – Hannah

- Milestone Reports
- Major contributor to project paper
- Contributed to presentation

Group Contributions – Kiro

- Group coordinator
- One of the lead programmers
- Contributed to the presentation and demo

Demo Time

Questions?