Celebrity Face Recognition

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Introduction & Background

- We are huge fans of Brad Pitt!
- Wouldn’t it be super cool to detect Brad Pitt in a video filled with numerous people?

Objectives & Methodology

- Objective:
  - Recognize Brad Pitt's face amongst a group of individuals in a video
  - Draw a bounding box around the face with the highest probability of that being Brad Pitt

- Methods:
  - Utilize a pre-trained VGG-16 model to extract features from images of Brad Pitt
  - Train a neural network on extracted features with logistic regression fully connected layer
  - Use OpenCV to recognize faces in a video and apply our model to predict how likely that face is Brad Pitt's or not.

Training Dataset

- Used OpenCV to create the images out of the videos
- Total Dataset = 1800 Images
  - Total images of Brad Pitt = 500 (video) + 400 (non-video) = 900
  - Total images of non-Brad-Pitt = 900(non-video) = 900

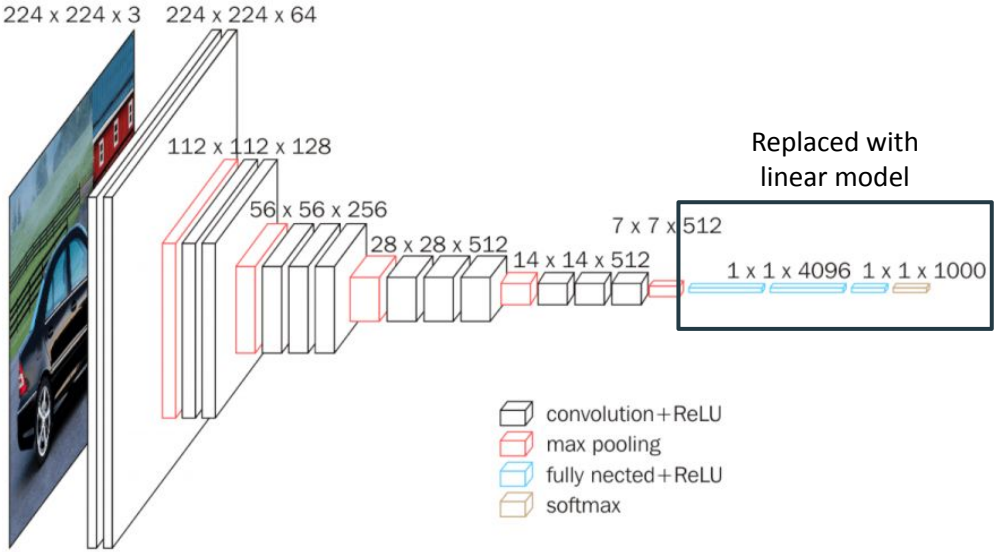
500 Brad Video Images

400 Brad PubFig Images

900 Non-Brad PubFig Images

VGG Model

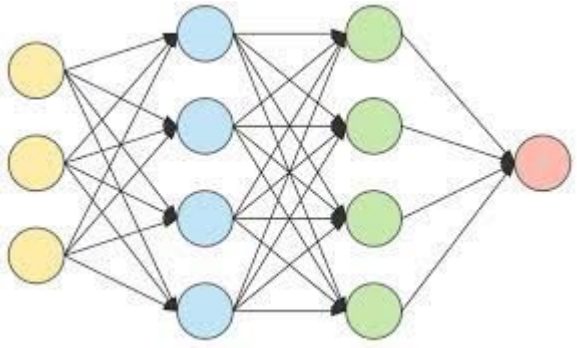
- Extracted features from raw images with pretrained VGG-16 model



Linear Model

- Input: flattened vector of 1x25800 features extracted from VGG-16
- 3 linear layers of Scaled Exponential Linear Unit activation
- 1 linear layer of sigmoid activation
- Output: 1x1 Pr[Brad]

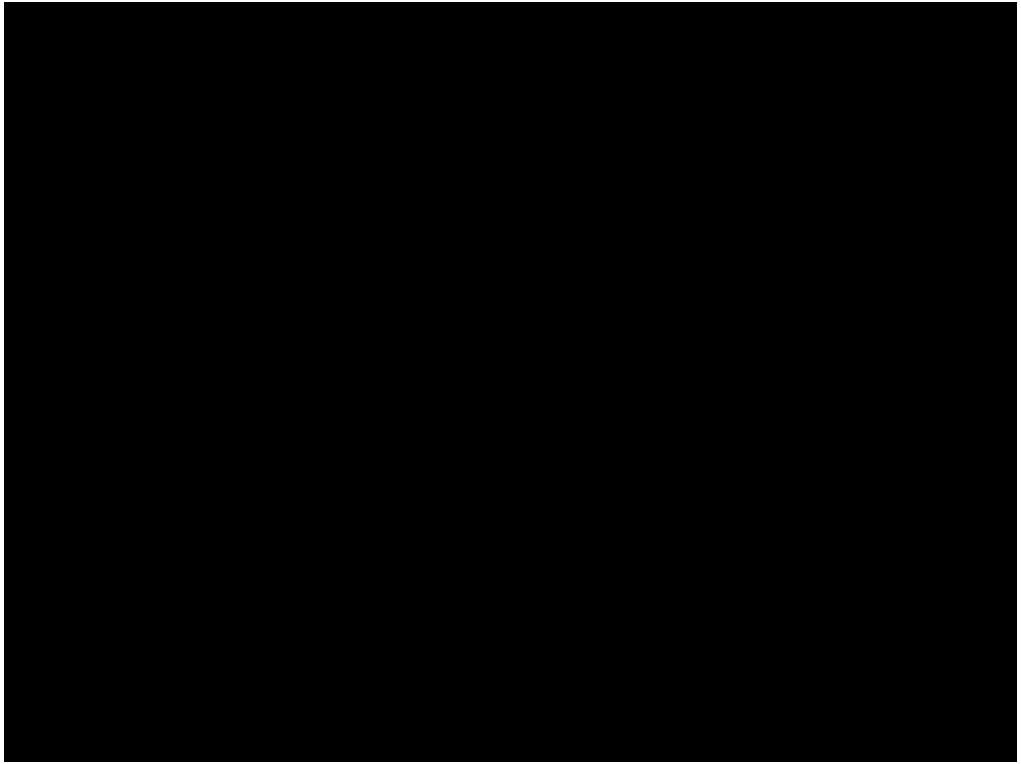
Layer (activation)	Output Shape	Param #
input	(1, 25088)	
linear_0 (SELU)	(1, 1000)	25089000
linear_1 (SELU)	(1, 500)	500500
linear_2 (SELU)	(1, 50)	25050
linear_3 (SIGMOID)	(1, 1)	51



Face Detection

- Create bounding box on Brad Pitt's face throughout the video
- For every video frame:
  - Use OpenCV to recognize all faces in the frame
  - Iterate through all faces and input them into our model
  - For each face we'll get a probability of how likely it is Brad Pitt
  - We add bounding box to face with highest probability of all
- Save output video as mp4

Demo



Results

Videos	# of Frames	Correctly Classified	% Correct
Just Brad 1	376	259	68.8%
Just Brad 2	325	307	94.4%
Brad in Friends	278	252	90.6%
Group at Table	270	237	87.7%

Challenges

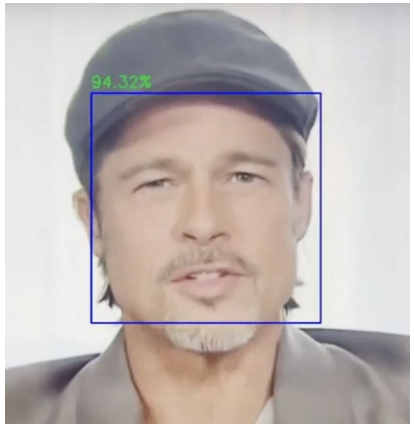
- Function VideoWriter_fourcc was corrupting our output video because we were specifying the wrong output format
- Used the resize function from PIL package as Cv2.resize function was not properly resizing our image
- Results were better when Brad was mostly facing the camera as opposed to looking sideways

Next Steps / Future Directions

- Extend our model to recognize multiple celebrities
- Improve our model's capability for recognition by adding images to the dataset where our celebrity (Brad Pitt) is seen from more diverse angles.

What Makes Our Project Unique?

- Diverse Training Set - Images and video-images of Brad Pitt from different angles
- Challenging Problem - Able to successfully detect Brad's face amongst 5 individuals
- Complex Methodology - Creating dataset, Drawing bounding box, Implementing VGG-16, etc.



Thank You So Much!

We would like to thank our TA, Phillipe Do, and our Professor Jianbo Shi for all of their contributions in helping us gather the right knowledge and tools to successfully complete our final project in Computer Vision.