The Fitting Room in Your Dream

MSiA 432 Deep Learning

Team 30%

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Project Introduction

Project Name: The Fitting Room In Your Dream

Project Description:

With the aim of preventing viral transmission, virtual try-ons have started to gain more popularity. **Our project aims to provide a virtual fitting room function for customers who want to change clothes online.**

Problem Statement

About: Create an **Unique** Virtual Try-On Experience

Objective

- Prevent viral transmission during COVID-19
- Allow shoppers try on their own designs

Target Audience

- Shoppers
- Designers
- Clothing retailers

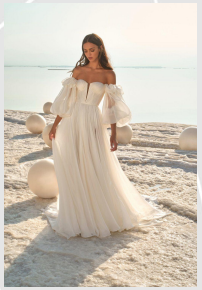
Elements of Difficulty

- HUGE computation cost
- LONG time to train
- HARD to accurately pinpoint the exact clothing pixels on the on an image

Our key advantage: Allow users to explore how famous artwork could be incorporated into their own clothing designs and gain purchasing insights.

Dataset






***Training:* iMaterialist Fashion 2019 at FGVC6**

- Fine-grained segmentation data for fashion and apparel. Labels of clothes category is provided for 50000+ pictures.

***Testing:* Female Dresses**

- 2000+ full face images of women in dress for model testing from Pinterest

Challenges:

- **Computation power** is needed for to pinpoint exact pixels on the image
- **Labels** of clothes category on pixel level (needed for training) unavailable for images from Pinterest
- Unable to detect **special poses** or overly **complicated dress design**
- Image resolutions might need to be increased by up-sampling pixels

Dataset - Alternative Approach

Using own dataset

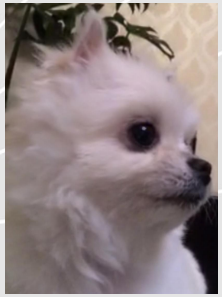
- If we use our dataset to train the model, we don’t have to do any shifting cropping, or augmenting our dataset. However, resolution refinement of the images might be needed. Bi-linear interpolation, cubic interpolation or nearest neighbor interpolation could be useful for up sampling.
- ***Challenge:*** The training process is time consuming and we don’t have sufficient data to generate reliable results.

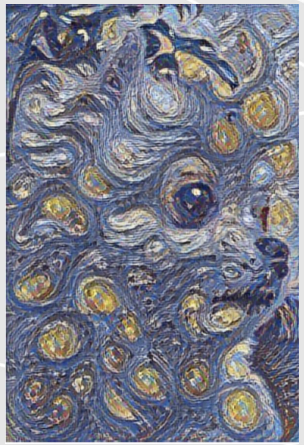
Technical Approach

Step 1:
Generate Stylized Designs

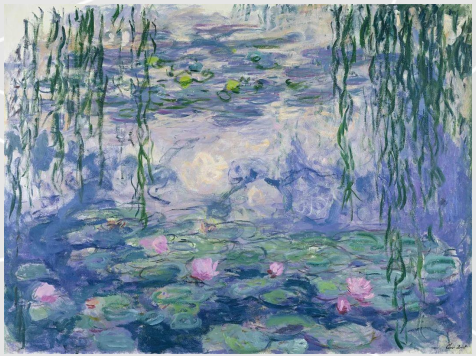
Step 2:
Pinpoint the Clothing Shape

Step 3:
Integration





DEMO: New Dress for Her

? +  ➡ 

?: A PICTURE OF YOUR PET OR FAVORITE DESIGNER, ANY VOLUNTEER?

Step 1: Generate Stylized Designs

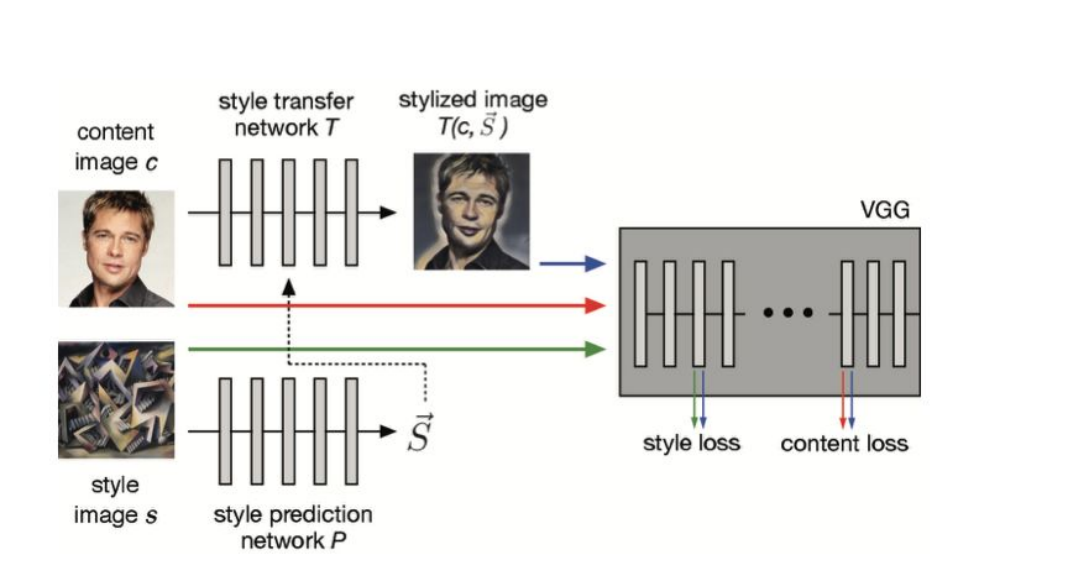
What shoppers give:

- Style image: famous artwork
- Content image: pet, brand logo, etc.

What shoppers get:

- Stylized design → Using Neural Style Transfer

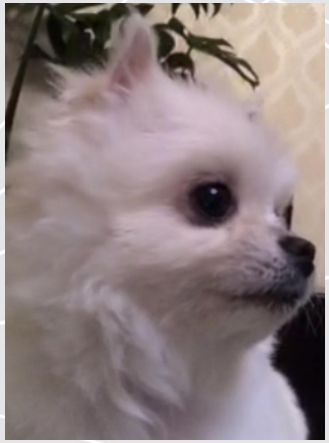
Step 1: Fast Style Transfer



Pre-trained TensorFlow Lite models

- Advantage: FAST to generate output (pretrained weights)
- Disadvantage: Cannot controlled over the way of combining features

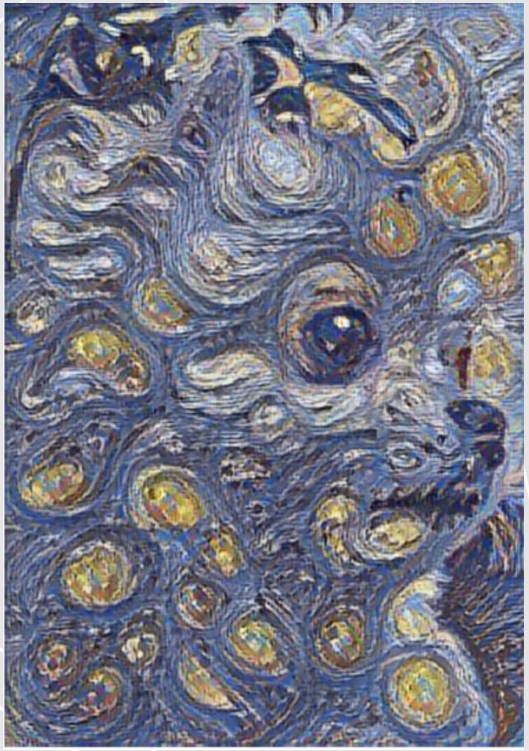
Step 1: Examples of Stylized Designs



My Puppy
-- Vivian

+

"**Starry** Nights"
-- Van Gogh



"**Starry**" puppy
-- Team 30%

Step 1: Examples of Stylized Designs

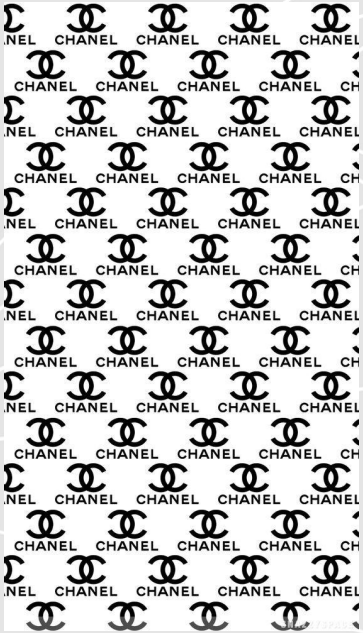
Someone's Cat
-- Stole from Google Image

+

"Sunflowers"
-- Van Gogh

"**Sunny**" Kitten
-- Team 30%

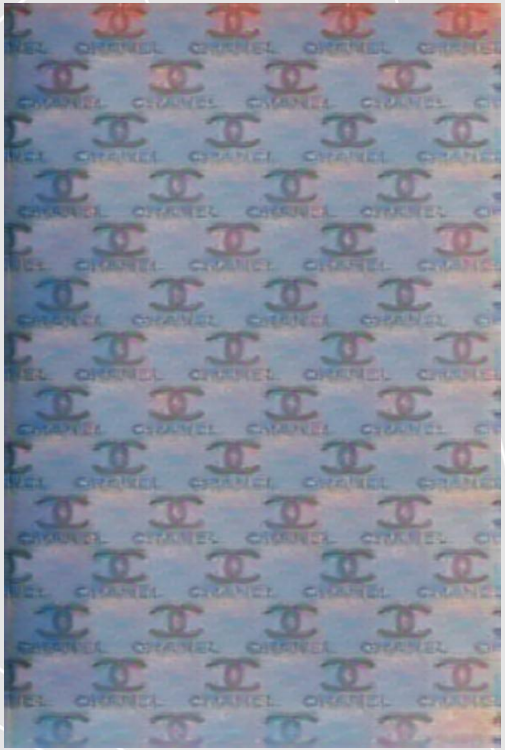
Step 1: Examples of Stylized Designs



Chanel LOGO
-- Chanel

+

"Sunrise"
-- Van Gogh



Chanel in Watercolor
-- Team 30%

Step 2: Pinpoint the Clothing Shape

Use Python albumentations package with pretrained parameters to locate the area of clothes in the picture.

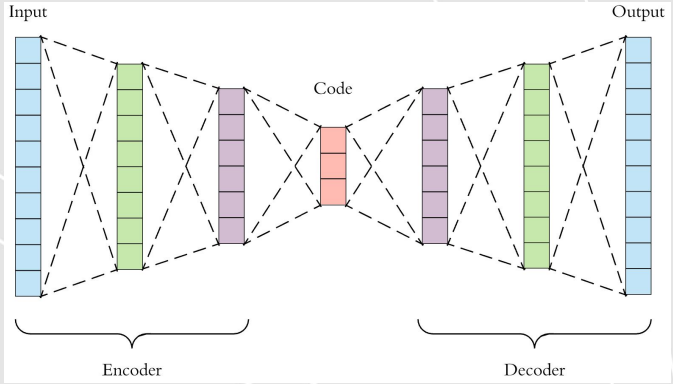
Blocks: Around 20+ Blocks & 100+ Layers
Example Block: InputLayer → Conv2d → BatchNorm2d → Swish → Conv2d → Swish → Conv2d → Conv2d → BatchNorm2d → Identity
Layer Functions: Conv2d, BatchNorm2d, Swish, ReLU, Identity

Encoder blocks:

- DepthwiseSeparableConv
- InvertedResidual

Decoder block:

- DecoderBlock

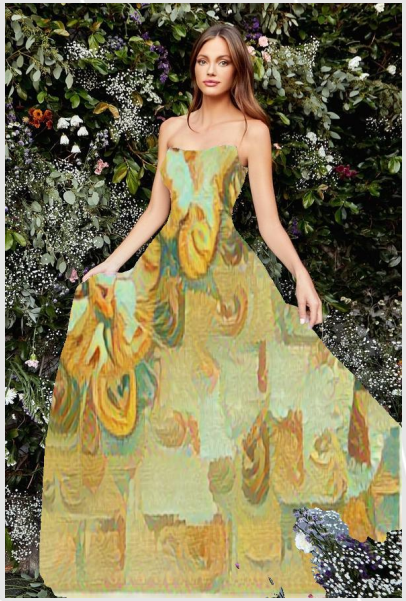


Step 2: Examples of Clothing Shapes

Locate the clothing pixels in the images

Step 3: Integration

Recursively replace the pixel on original image with pixel on new masked image if the value is positive



Live Demo

Time to reveal our synthesized Picture

Results

- The newly generated designs are satisfactory most of the time.
- Based on the output pictures shown, our pipeline is able to accurately identify shapes of clothing within a picture and replace the original color with newly generated designs.
- 6 of us in our team and 10 volunteers tried our model. **15 out of 16** people really liked the resulting synthesized image and appreciated the newly generated design.

Conclusion

Our generated designs are considered fashion and our model is able to pinpoint the clothes on the image uploaded and help users try on clothes they designed.

- ***Limitations of approach:***
  - The current model and pipeline only focus on one clothes type: dress
  - The model occasionally identifies shoes and other accessories as part of the clothing
  - The pattern design can combine features in the artwork and the image uploaded, but cannot be controlled over the way of combining
- ***How to improve future work:***
  - Add more clothes types to attract more users; Adjust the transparency of newly generated clothes before plugging it back to the picture to maintain features like clothes textures

References

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Thank You