My Style Manager

Autoencoder와 추천 시스템을 활용한 코디 추천 모델

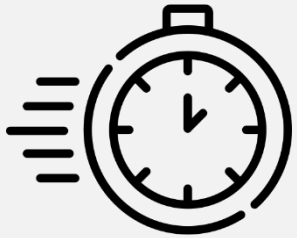
주제 선정 배경 및 이유

이른 아침, 간신히 일어나 눈을 비비고 나갈 준비를 하며

"이 옷엔 어떤 옷을 입어야 하지?"

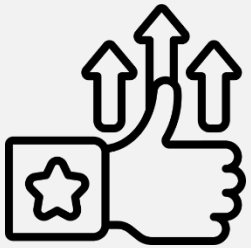
고민하는 당신을 위한 쉽고 간편한 코디 추천 모델

마이 스타일 매니저를 추천해드립니다!



준비시간 단축

유사 제품 구매 가능



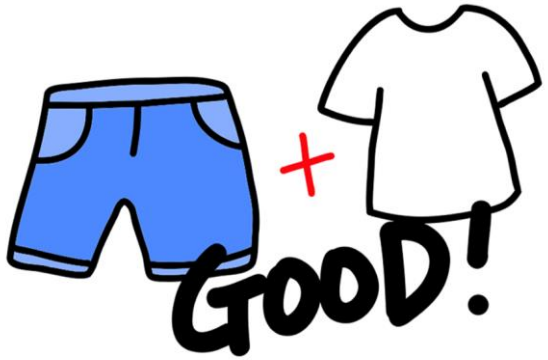
패션 자신감 향상

프로젝트 목표 및 서비스의 흐름

1

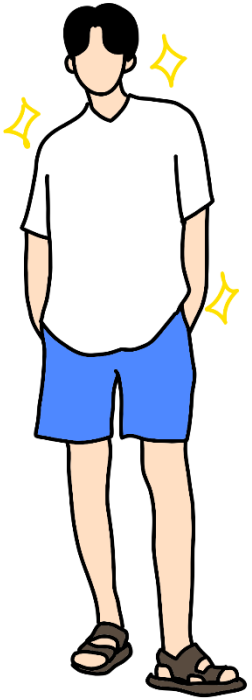
원하는 의류의 사진을
촬영하여 업로드한다

2



학습된 모델이 데이터를
기반으로 어울리는
코디 사진을 추천해준다

3



추천 받은 코디 사진을
참고하면 출근 준비 끝!

데이터 출처 / 전처리

데이터 출처

AI-Hub
'패션 상품 및 착용 이미지'

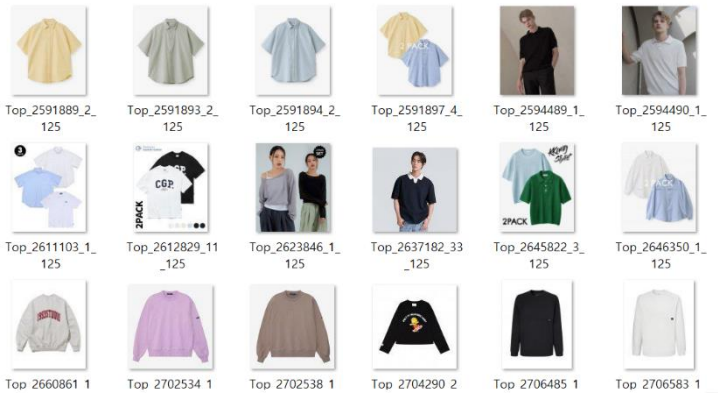
AI Hub

- Item-Image (33,170)
  - Training
  - Validation
- Model-Image (94,088)

무신사
카테고리별 상품 이미지

MUSINSA

crawling



데이터 전처리

cv2.cvtColor
이미지 RGB 포맷 변경

Image crop
물체 중심 이미지 크롭

cv2.resize
이미지 크기(해상도) 변경

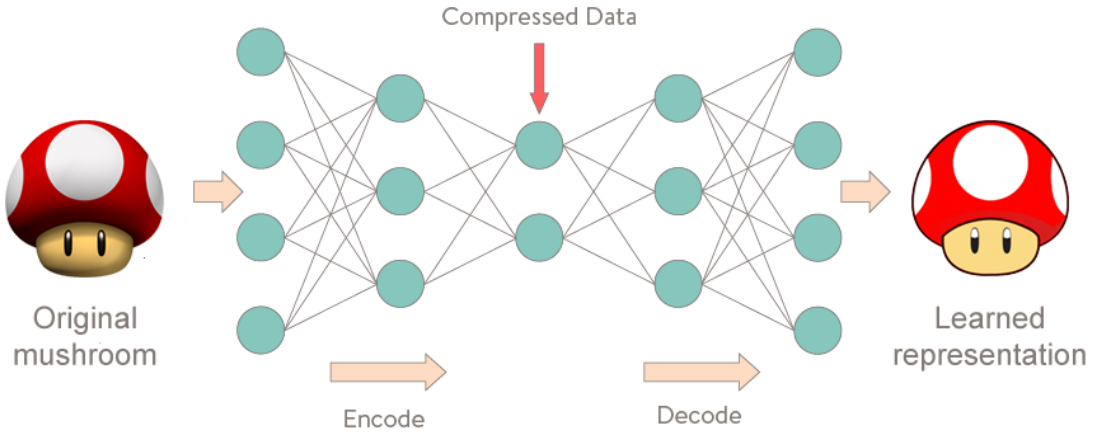
gamma Correction
감마 보정 시행

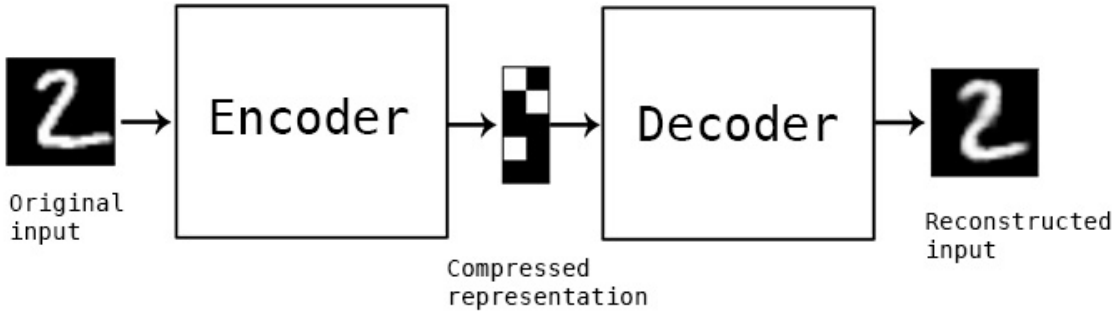
Image Normalization
Pixel 값 (0,1) 정규화

모델링

Image based Fashion Recommendation System (64x64 Ver)

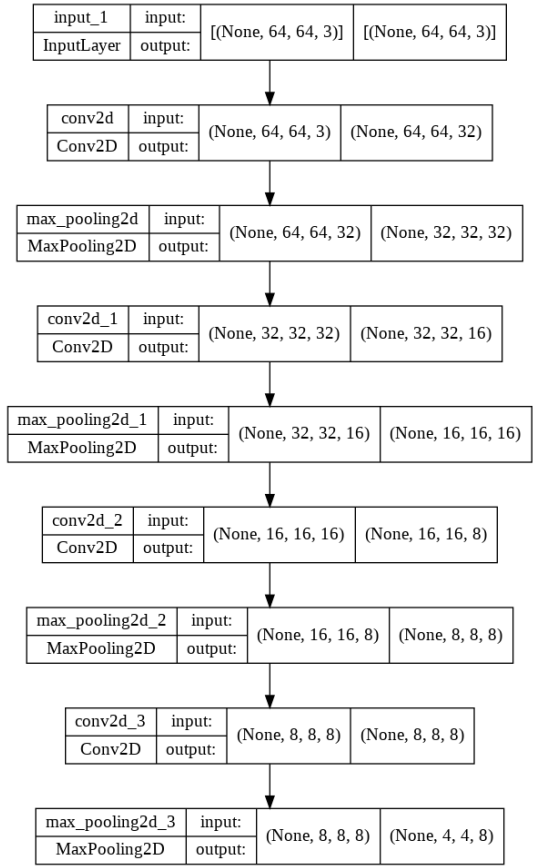
AutoEncoder Draft Reference





Convolutional AutoEncoder Model Design & Draft

(Encoder Part)



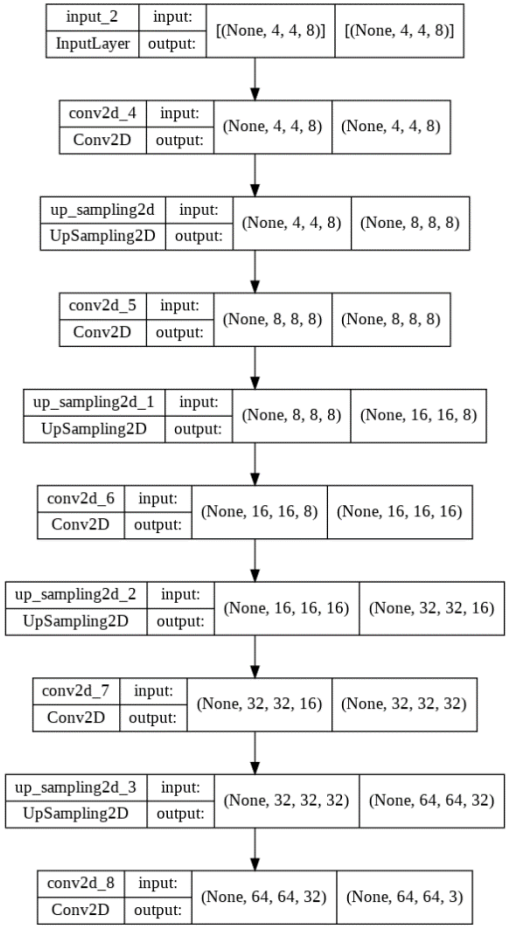

```
Model: "model"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
input_1 (InputLayer)         [(None, 64, 64, 3)]       0
conv2d (Conv2D)              (None, 64, 64, 32)        896
max_pooling2d (MaxPooling2D  (None, 32, 32, 32)        0
)
conv2d_1 (Conv2D)            (None, 32, 32, 16)        4624
max_pooling2d_1 (MaxPooling  (None, 16, 16, 16)        0
2D)
conv2d_2 (Conv2D)            (None, 16, 16, 8)         1160
max_pooling2d_2 (MaxPooling  (None, 8, 8, 8)           0
2D)
conv2d_3 (Conv2D)            (None, 8, 8, 8)           584
max_pooling2d_3 (MaxPooling  (None, 4, 4, 8)           0
2D)
=================================================================
Total params: 7,264
Trainable params: 7,264
Non-trainable params: 0
_________________________________________________________________
```

모델링

Image based Fashion Recommendation System (64x64 Ver)

Convolutional AutoEncoder Model Design & Draft

(Decoder Part)



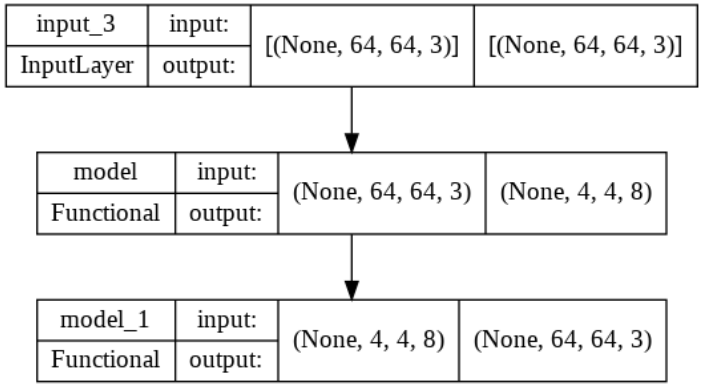
Model: "model_1"

Layer (type)	Output Shape	Param #
input_2 (InputLayer)	[(None, 4, 4, 8)]	0
conv2d_4 (Conv2D)	(None, 4, 4, 8)	584
up_sampling2d (UpSampling2D)	(None, 8, 8, 8)	0
conv2d_5 (Conv2D)	(None, 8, 8, 8)	584
up_sampling2d_1 (UpSampling2D)	(None, 16, 16, 8)	0
conv2d_6 (Conv2D)	(None, 16, 16, 16)	1168
up_sampling2d_2 (UpSampling2D)	(None, 32, 32, 16)	0
conv2d_7 (Conv2D)	(None, 32, 32, 32)	4640
up_sampling2d_3 (UpSampling2D)	(None, 64, 64, 32)	0
conv2d_8 (Conv2D)	(None, 64, 64, 3)	867

Total params: 7,843
Trainable params: 7,843
Non-trainable params: 0

Convolutional AutoEncoder Model Design & Draft

(ConvAE (Encoder + Decoder))



Model: "model_2"

Layer (type)	Output Shape	Param #
input_3 (InputLayer)	[(None, 64, 64, 3)]	0
model (Functional)	(None, 4, 4, 8)	7264
model_1 (Functional)	(None, 64, 64, 3)	7843

Total params: 15,107
Trainable params: 15,107
Non-trainable params: 0

모델링

Image based Fashion Recommendation System (64x64 Ver)

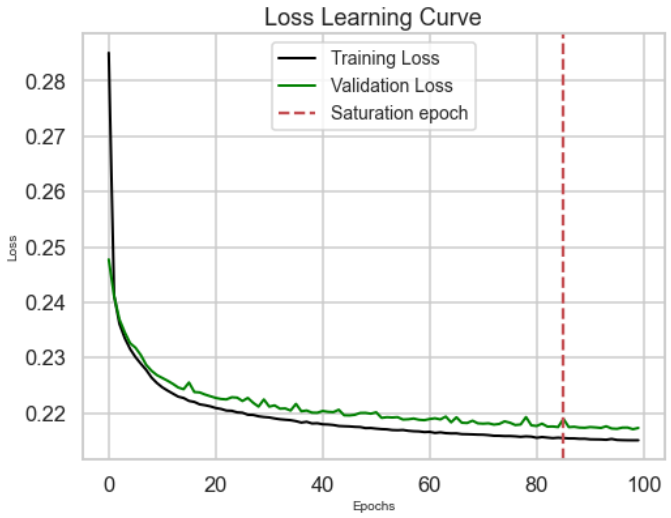
Modeling Result & Performance Evaluation

Training Time : **12:41:57**

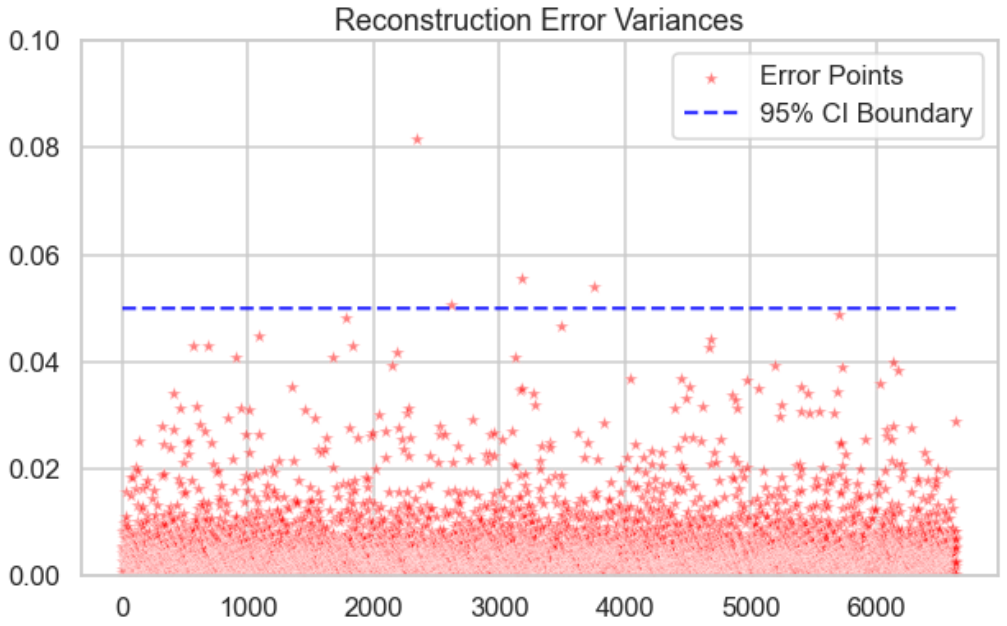
Training History

	loss	val_loss
95	0.215168	0.217177
96	0.215134	0.217394
97	0.215113	0.217406
98	0.215106	0.217107
99	0.215111	0.217343

Loss Learning Curve



Reconstruction Error Variances



Test Data Evaluation

```
208/208 [==============================] - 31s 129ms/step - loss: 0.2166
test loss : 0.2166
```

모델링

Image based Fashion Recommendation System (64x64 Ver)

Modeling Result & Performance Evaluation

Test & Reconstruction Image Samples

Test Images

Reconstructed Images

Latent Space Projection

Latent Feature Extraction by Encoder Part

input_1	input:	[(None, 64, 64, 3)]	[(None, 64, 64, 3)]
InputLayer	output:		

↓

conv2d	input:	(None, 64, 64, 3)	(None, 64, 64, 32)
Conv2D	output:		

↓

max_pooling2d	input:	(None, 64, 64, 32)	(None, 32, 32, 32)
MaxPooling2D	output:		

↓

conv2d_1	input:	(None, 32, 32, 32)	(None, 32, 32, 16)
Conv2D	output:		

↓

max_pooling2d_1	input:	(None, 32, 32, 16)	(None, 16, 16, 16)
MaxPooling2D	output:		

↓

conv2d_2	input:	(None, 16, 16, 16)	(None, 16, 16, 8)
Conv2D	output:		

※ High Dim Images (64,64,3)
→ Low Dim Features(4,4,8)

↓

max_pooling2d_2	input:	(None, 16, 16, 8)	(None, 8, 8, 8)
MaxPooling2D	output:		

↓

conv2d_3	input:	(None, 8, 8, 8)	(None, 8, 8, 8)
Conv2D	output:		

↓

max_pooling2d_3	input:	(None, 8, 8, 8)	(None, 4, 4, 8)
MaxPooling2D	output:		

모델링

Image based Fashion Recommendation System (64x64 Ver)

Latent Space Projection

Latent Feature Space

	comp1	comp2	comp3	comp4	comp5	comp6	comp7	comp8	label
0	3.670829	0.488182	4.741859	1.273471	1.086036	1.266953	5.101594	0.466279	Item-Image₩0928015_B.jpg
1	3.687016	0.438862	4.726101	1.260007	1.113906	1.261978	5.113382	0.480564	Item-Image₩0928015_F.jpg
2	3.678386	0.497772	4.745491	1.274425	1.088167	1.272623	5.099578	0.466892	Item-Image₩0929029_B.jpg
3	3.666209	0.488873	4.733748	1.271945	1.101050	1.258321	5.098758	0.474383	Item-Image₩0929029_F.jpg
4	6.417155	9.030645	7.210944	3.931133	1.731876	5.646265	4.130309	5.715511	Item-Image₩1008001_B.jpg

※ By Projecting Images as low-dimensional Features,
Easy to develop Recommendation System such as Similarity Calculations

Autoencoder를 활용하여 최종적으로 도출해낸 학습 데이터셋의 8가지 feature component

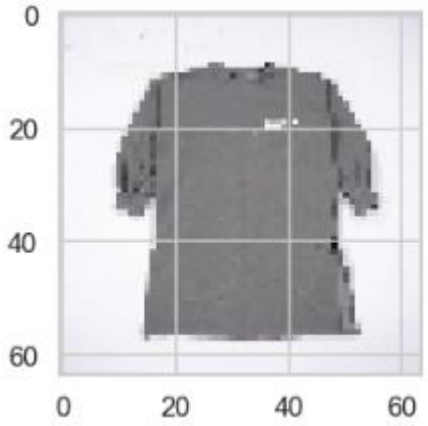
이후, 사용자로부터 받는 입력 이미지의 feature component 와 비교할 예정

모델링

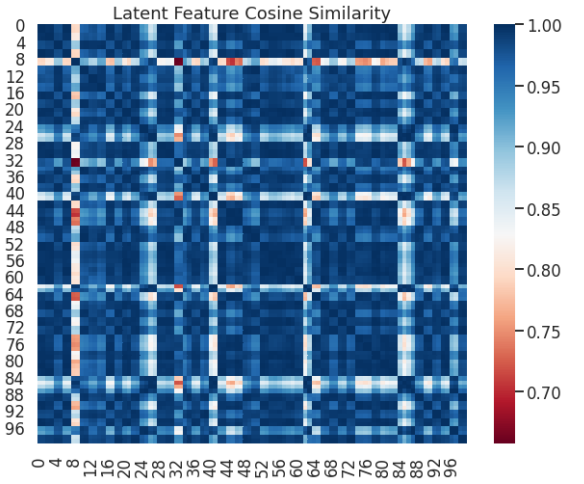
Image based Fashion Recommendation System (64x64 Ver)

Similarity Calculation & Top 10 item Return

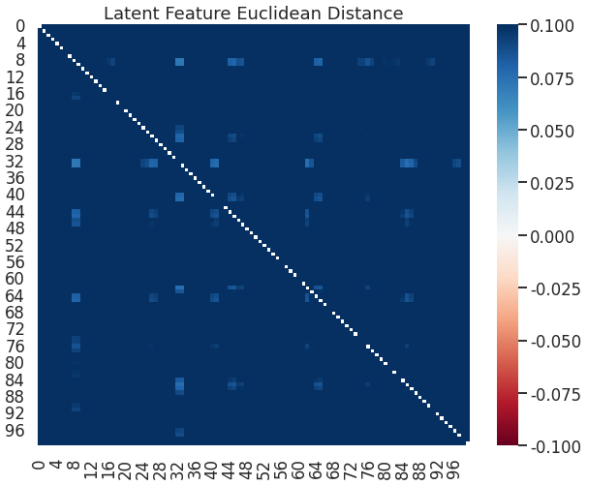
Sample Images



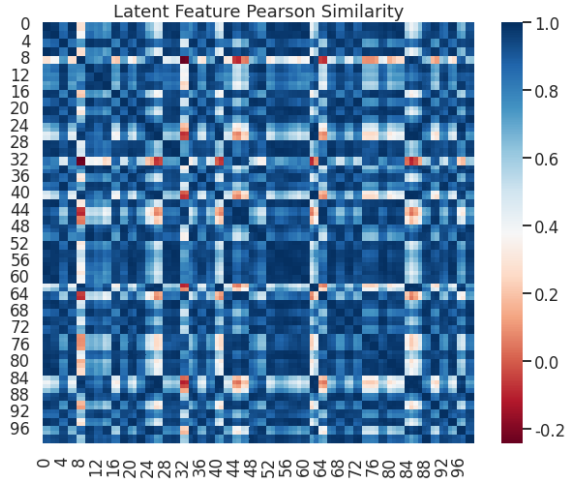
Cosine Similarity



Euclidean Distance



Pearson Similarity



모델링

Image based Fashion Recommendation System (64x64 Ver)

Fashion Coordination Recommendation

	wearing	hat	main_top	inner_top	bottom	shoes
0	1008_1008_720_A_A001_A001_000.jpg	1008013	1008011	0	1008012	0
1	1030_1030_720_A_A002_232_223_222_A002_000.jpg	1029449	1029157	0	1029107	0
2	1030_1030_720_A_A003_232_220_222_A003_000.jpg	1029442	1029411	0	1029109	0
3	1030_1030_720_B_B002_232_221_223_B002_000.jpg	1029434	1029073	0	1029141	0
4	1030_1030_720_B_B003_232_227_223_B003_000.jpg	1029431	1029255	0	1029142	0

※ fashion_df.shape : (18040,6)

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Image based Fashion Recommendation System (64x64 Ver)

Fashion Coordination Recommendation

Match the Coordination

```
recomm_df : 10 DataFrame
1 item's coordination cases : 3
2 item's coordination cases : 1
3 item's coordination cases : 3
4 item's coordination cases : 2
5 item's coordination cases : 2
6 item's coordination cases : 1
7 item's coordination cases : 1
8 item's coordination cases : 2
9 item's coordination cases : 4
10 item's coordination cases : 1
```

Top10 Similar Images

Fashion Best Fit Recommendatation!!

모델링

Image based Fashion Recommendation System (64x64 Ver)

Fashion Coordination Recommendation

Another Use Case Result

Top10 Similar Images

Top10 Similar Images

Fashion Best Fit Recommendatation!!

Fashion Best Fit Recommendatation!!

모델링

Image based Fashion Recommendation System (64x64 Ver)

Fashion Coordination Recommendation

Another Use Case Result

Top10 Similar Images

Top10 Similar Images

Fashion Best Fit Recommendatation!!

Fashion Best Fit Recommendatation!!

프로젝트 진행 중 겪은 문제

Aa 이름	작성자		속성
예시) 데이터가 다운로드 용량이 너무 커서 난항임	박규호	2022년 8월 10일	Done
이미지 전처리 단계에서 의류를 정확하게 디텍팅하는 방법 (Crop, 보정, 크기)	박준혁	2022년 8월 10일	Done
ConvAE 개선방안 : [Crop 후 Center, Contrast, Layer, HyperParamter, Data 증강,	박준혁	2022년 8월 10일	Done
Github에 이미지를 어떻게 올리면 좋을까?	선은지	2022년 8월 12일	Done
입력받는 사진을 완벽하게 통제할 수 있을까?	서효정	2022년 8월 12일	Done
상품이미지랑 모델이미지가 맵핑이 제대로 안되어있는지 아님 규칙을 못찾는 건지 알 수가 없네ㅠㅠ	서효정	2022년 8월 16일	Done

향후 개선사항

데이터 화질 128 * 128 로 적용하여 옷의 질감과 디테일 살리기

모델 구현 로컬이 아닌 Streamlit으로 구현

무신사 크롤링 데이터 연관상품 추천으로 링크 걸기

모델 성능 더 높여보기

팀원 소개

Special thx to 정아

박규호

선은지

서효정

박준혁

장해식

- 무신사 크롤링
- 데이터용량 핸들링
- 스트림릿 배포
- 모델학습
- 오토인코더 모델링
- 잠재표현형 기반 유사도 계산
- 데이터전처리
- 스트림릿 페이지 디자인
- 발표 피피티 제작
- 추천 시스템 설계


My Style
Manager
Whenever, wherever, next to you