



# My Style Manager

Autoencoder와 추천 시스템을 활용한 코디 추천 모델





## 팀원 소개



선은지



박규호



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



## 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

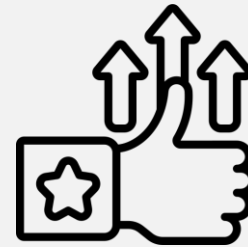
**마이 스타일 매니저**를 추천드립니다!



준비시간 단축



유사 제품 구매 가능



패션 자신감 향상

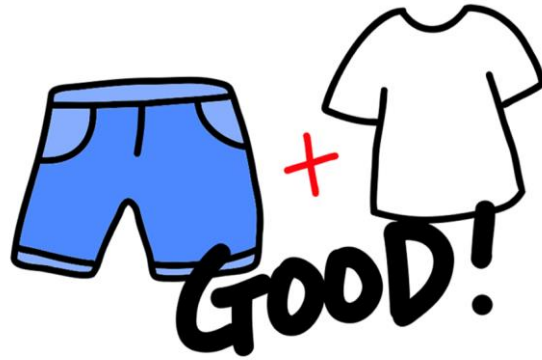
## 프로젝트 목표 및 서비스의 흐름

1



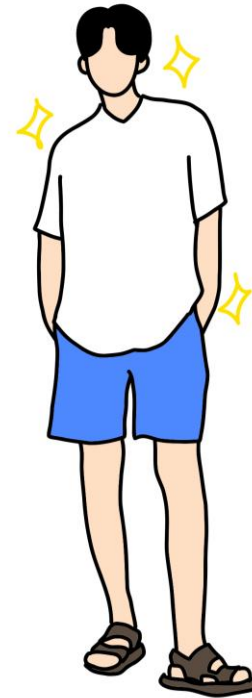
원하는 의류의 사진을  
촬영하여 업로드한다

2



학습된 모델이 데이터를  
기반으로 어울리는  
코디 사진을 추천해준다

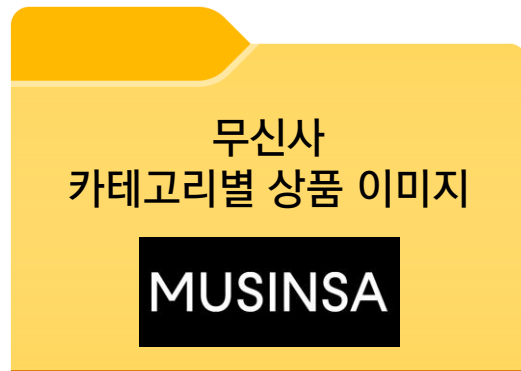
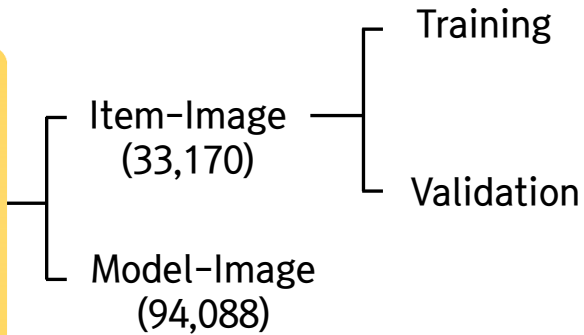
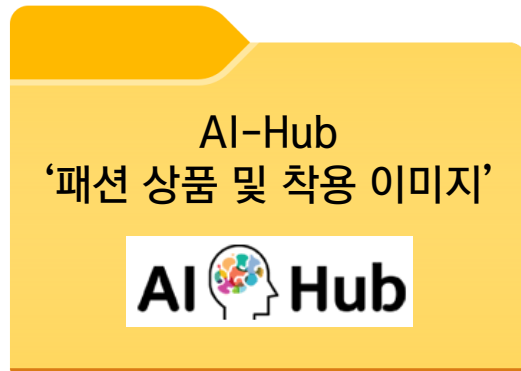
3



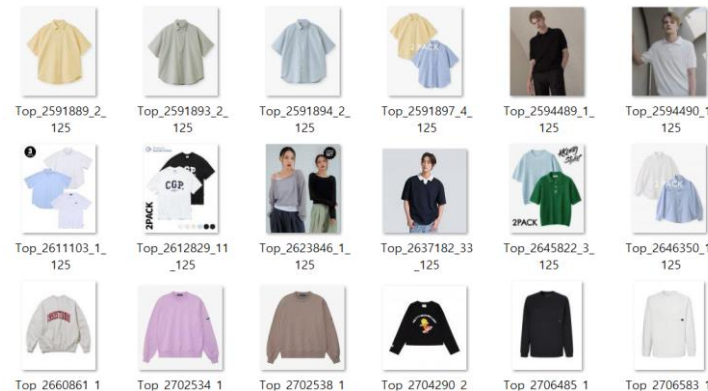
추천 받은 코디 사진을  
참고하면 출근 준비 끝!

# 데이터 출처 / 전처리

## 데이터 출처



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**

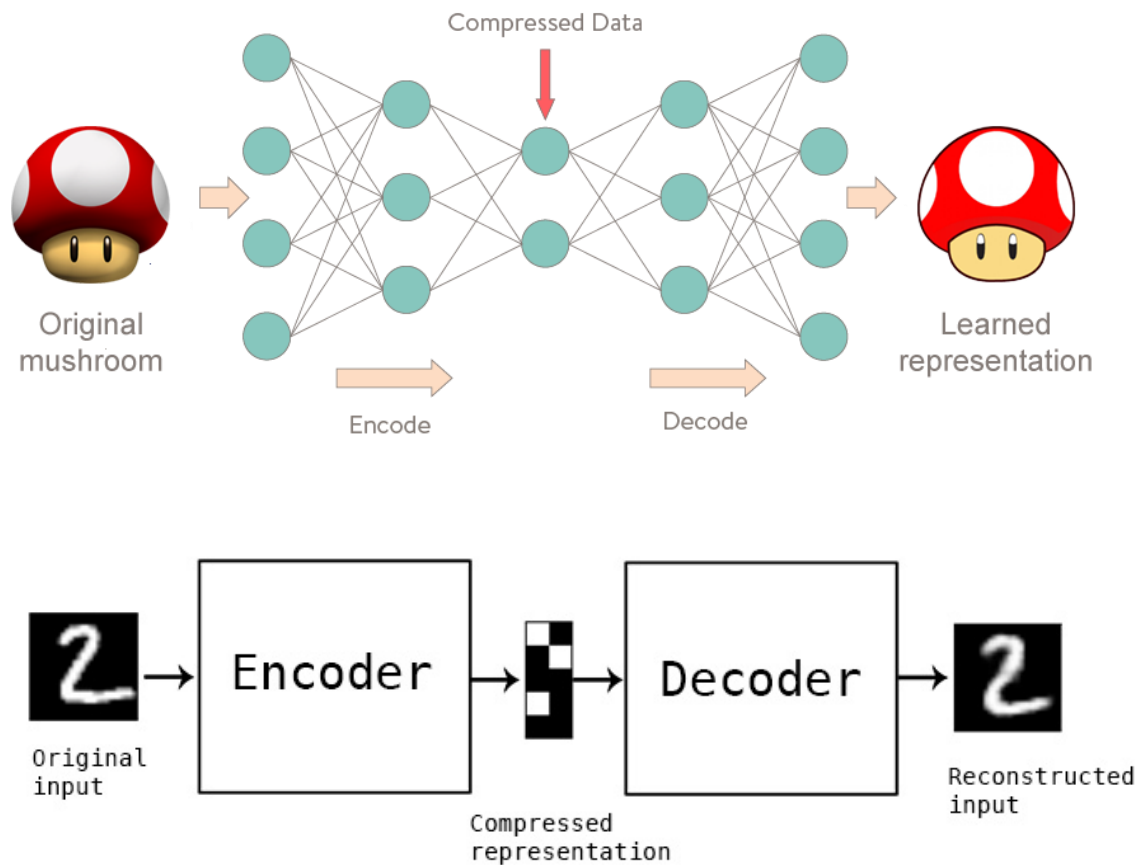
Pixel 값 (0,1) 정규화



# 모델링

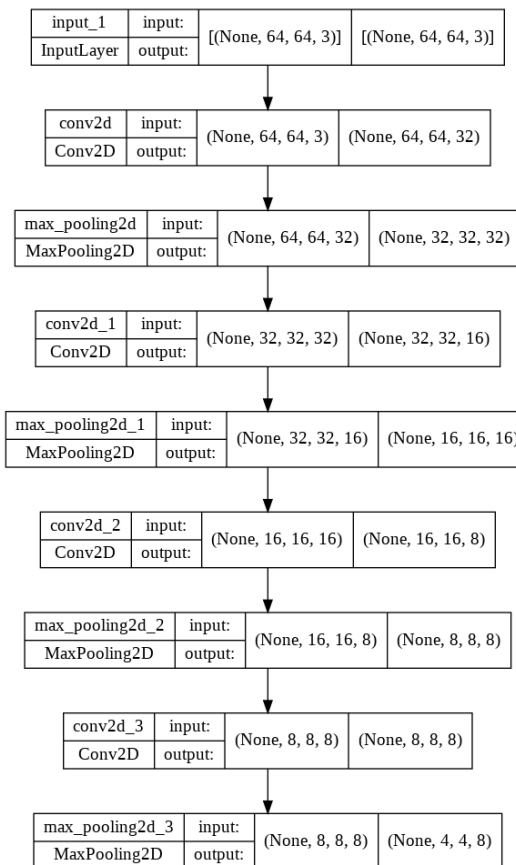
## Image based Fashion Recommendation System (64x64 Ver)

### 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 (MaxPooling2D)	(None, 16, 16, 16)	0
conv2d_2 (Conv2D)	(None, 16, 16, 8)	1160
max_pooling2d_2 (MaxPooling2D)	(None, 8, 8, 8)	0
conv2d_3 (Conv2D)	(None, 8, 8, 8)	584
max_pooling2d_3 (MaxPooling2D)	(None, 4, 4, 8)	0
Total params: 7,264		
Trainable params: 7,264		
Non-trainable params: 0		

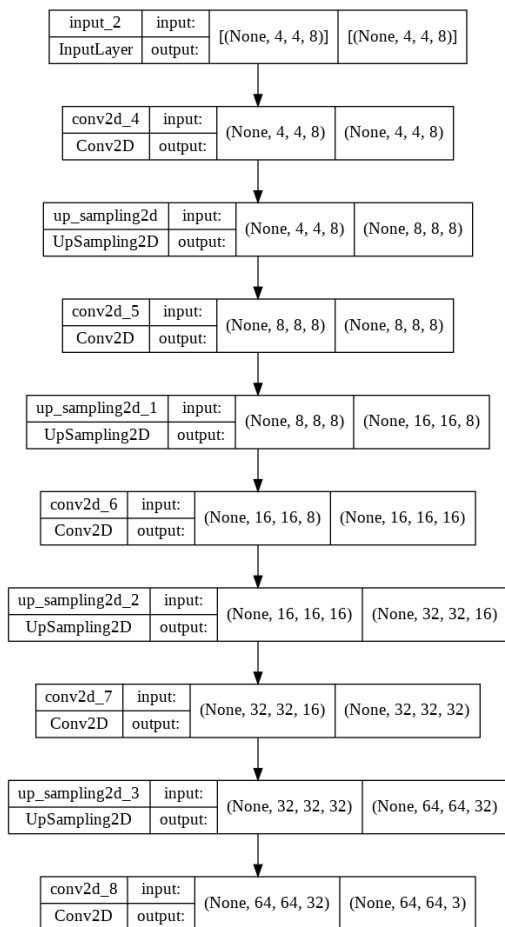


# 모델링

## Image based Fashion Recommendation System (64x64 Ver)

### Convolutional AutoEncoder Model Design & Draft

(Decoder Part)



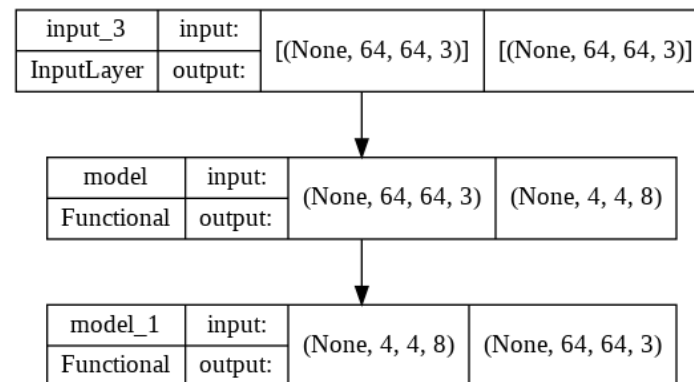
Model: "model\_1"

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

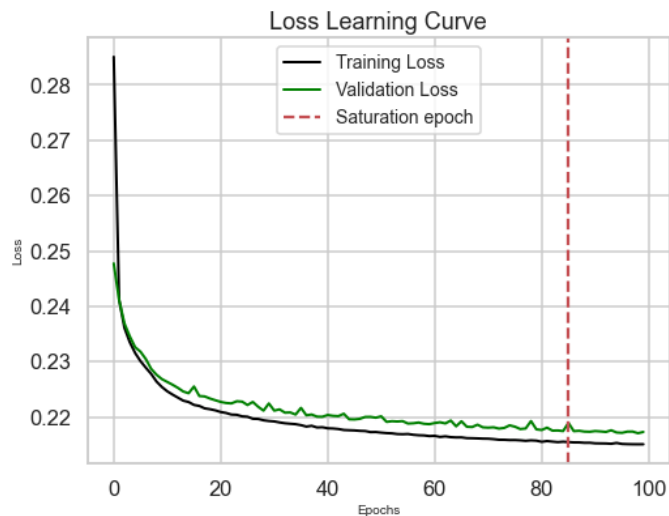
Training History

	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

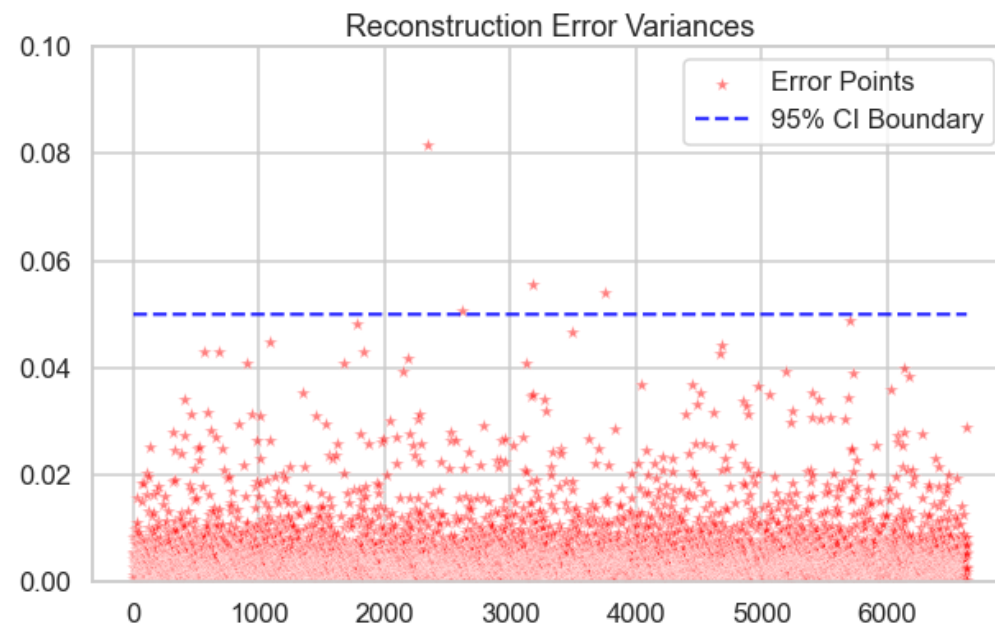
Test Data Evaluation

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

Loss Learning Curve



Reconstruction Error Variances







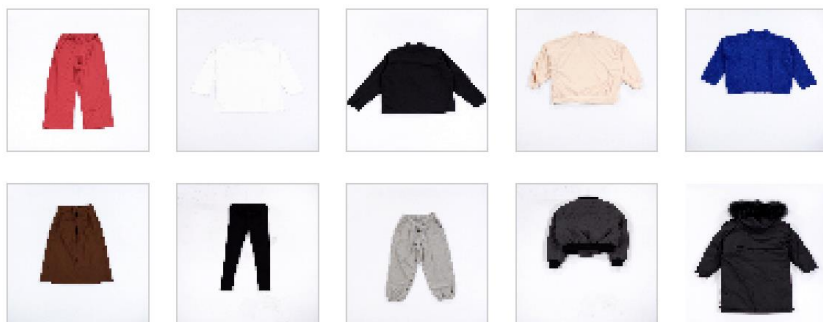
# 모델링

Image based Fashion Recommendation System (64x64 Ver)

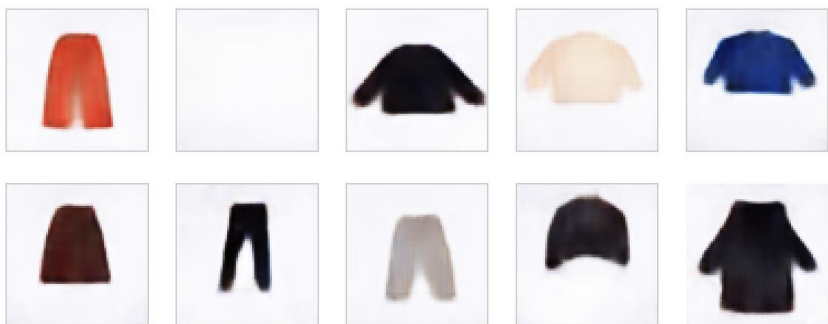
## Modeling Result & Performance Evaluation

### 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 데이터셋**의 8가지 feature component  
이후, **사용자로부터 받는 입력 이미지**의 feature component 와 비교할 예정

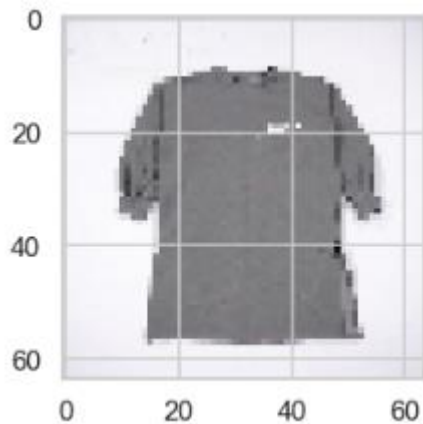


# 모델링

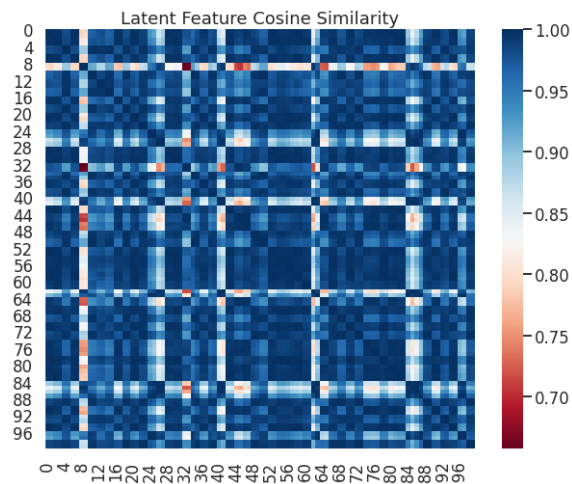
## Image based Fashion Recommendation System (64x64 Ver)

### Similarity Calculation & Top 10 item Return

Sample Images



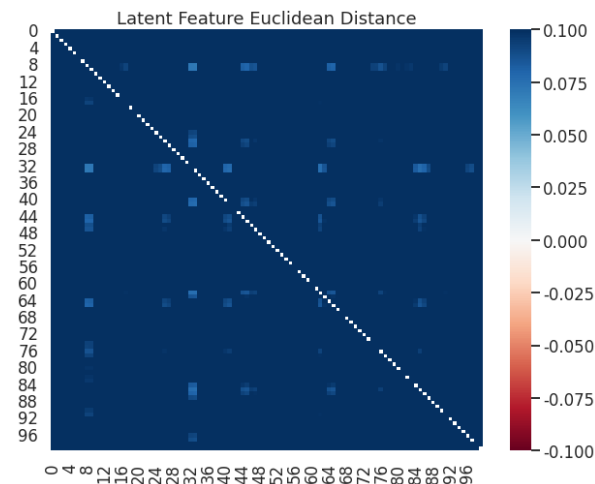
Cosine Similarity



Top10 Similar Images



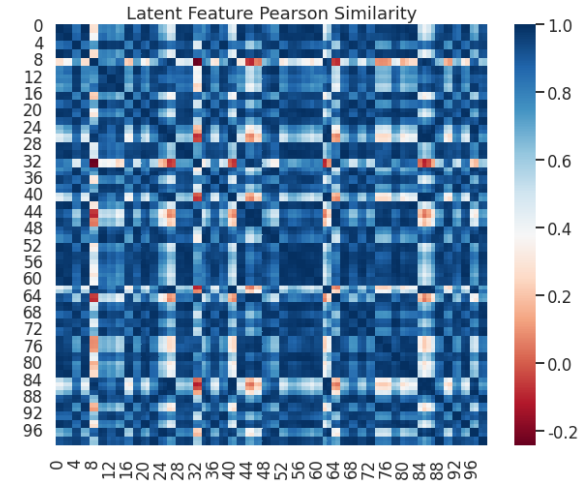
Euclidean Distance



Top10 Similar Images



Pearson Similarity



Top10 Similar Images





# 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)



# 모델링

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 Recommendation!!





# 모델링

Image based Fashion Recommendation System (64x64 Ver)

## Fashion Coordination Recommendation

### Another Use Case Result

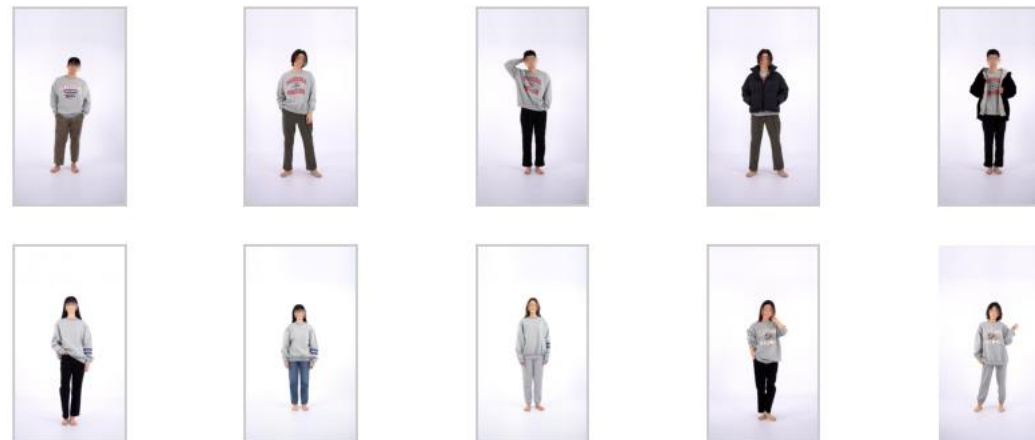
Top10 Similar Images



Top10 Similar Images



Fashion Best Fit Recommendation!!



Fashion Best Fit Recommendation!!





# 모델링

Image based Fashion Recommendation System (64x64 Ver)

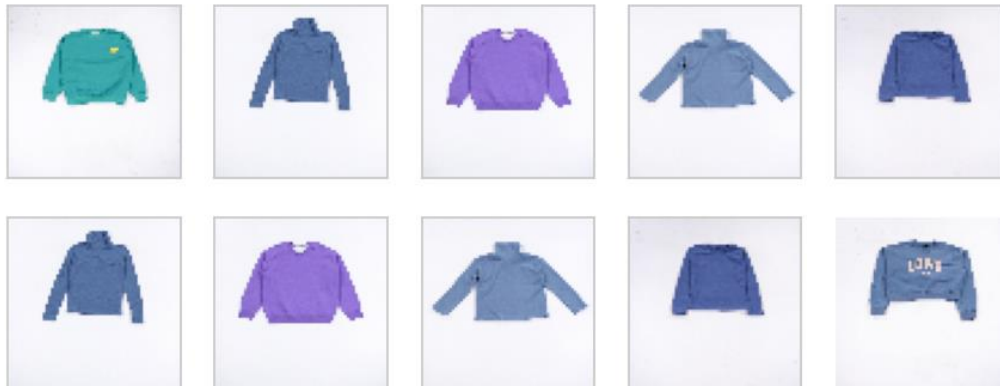
## Fashion Coordination Recommendation

### Another Use Case Result

Top10 Similar Images



Top10 Similar Images



Fashion Best Fit Recommendation!!



Fashion Best Fit Recommendation!!





## 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

A modern office interior with large windows, indoor plants, and modular furniture. The space is bright and airy, with a high ceiling and exposed ductwork. The text "My Style Manager" is overlaid in the center.

# My Style Manager

Whenever, wherever, next to you