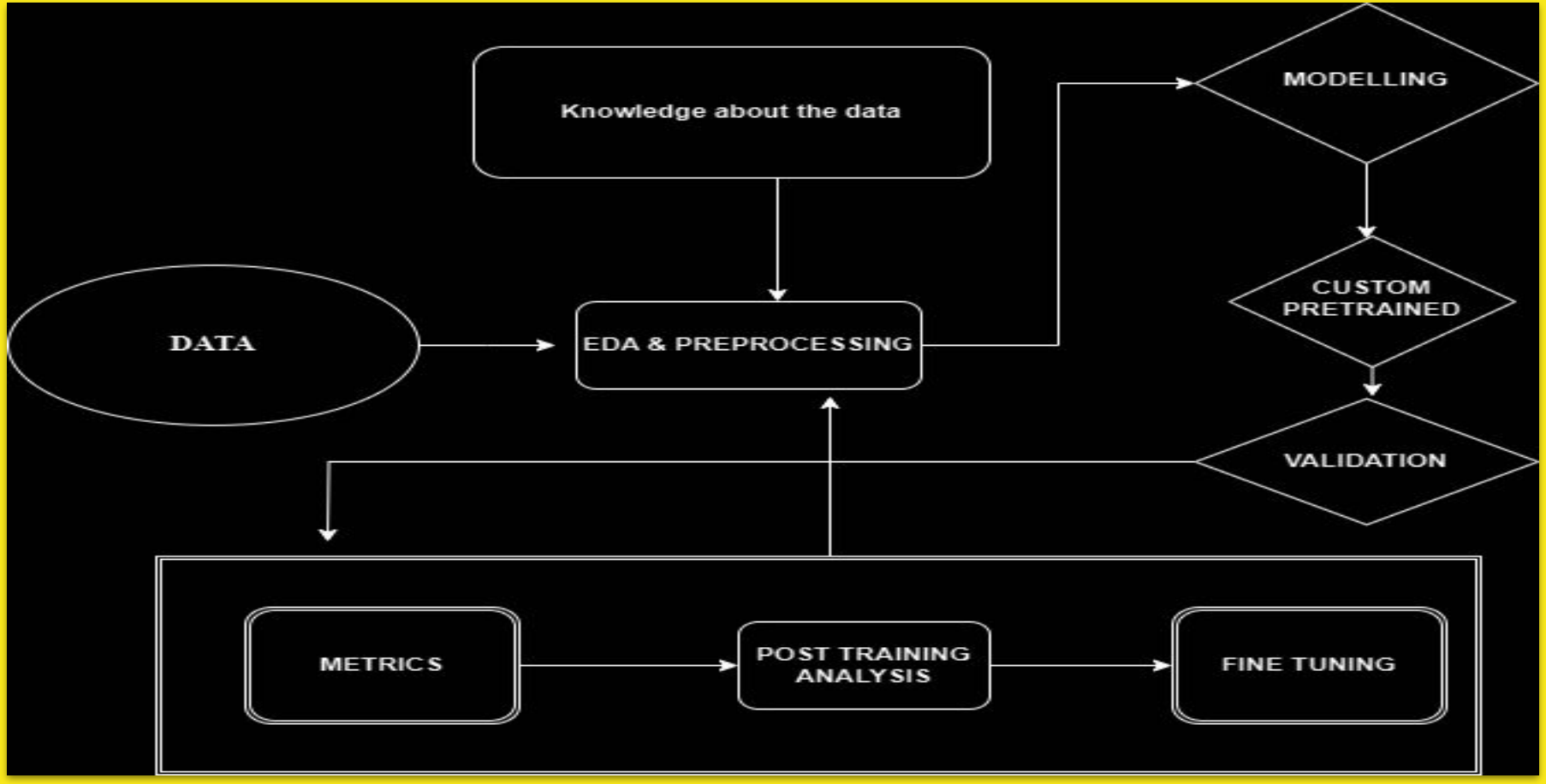
FASHION IN THE CITY

A computer vision project that takes image input and outputs the attributes of the image

MOTIVATION

- Global fashion industry was estimated at **$1.7 Trillion** in 2023
- United States, the fashion industry is valued at **$343.70 Billion**
- **$1460** per capita spending on clothing and footwear, the United States leads the pack as the top per capita spending on fashion
- **36%** of Gen Z buy new clothing at least every month
- Computer vision in healthcare, sports, automobile industries but not so much work has been done in the fashion industry
- personalized recommendable both affordable, reproducible


2.
1.
3.
WE
SHOULD
ALL BE
FEMINISTS


Knowledge about the data
MODELLING
DATA
EDA & PREPROCESSING
CUSTOM PRETRAINED
VALIDATION
METRICS
POST TRAINING ANALYSIS
FINE TUNING

DATA

Image file and annotation folder with 331,213 samples of data.

- Image ID
- Encoded Pixels
- Height * Width
- ClassID

Json Data

- ID
- Name
- Supercategory
- 45 attributes

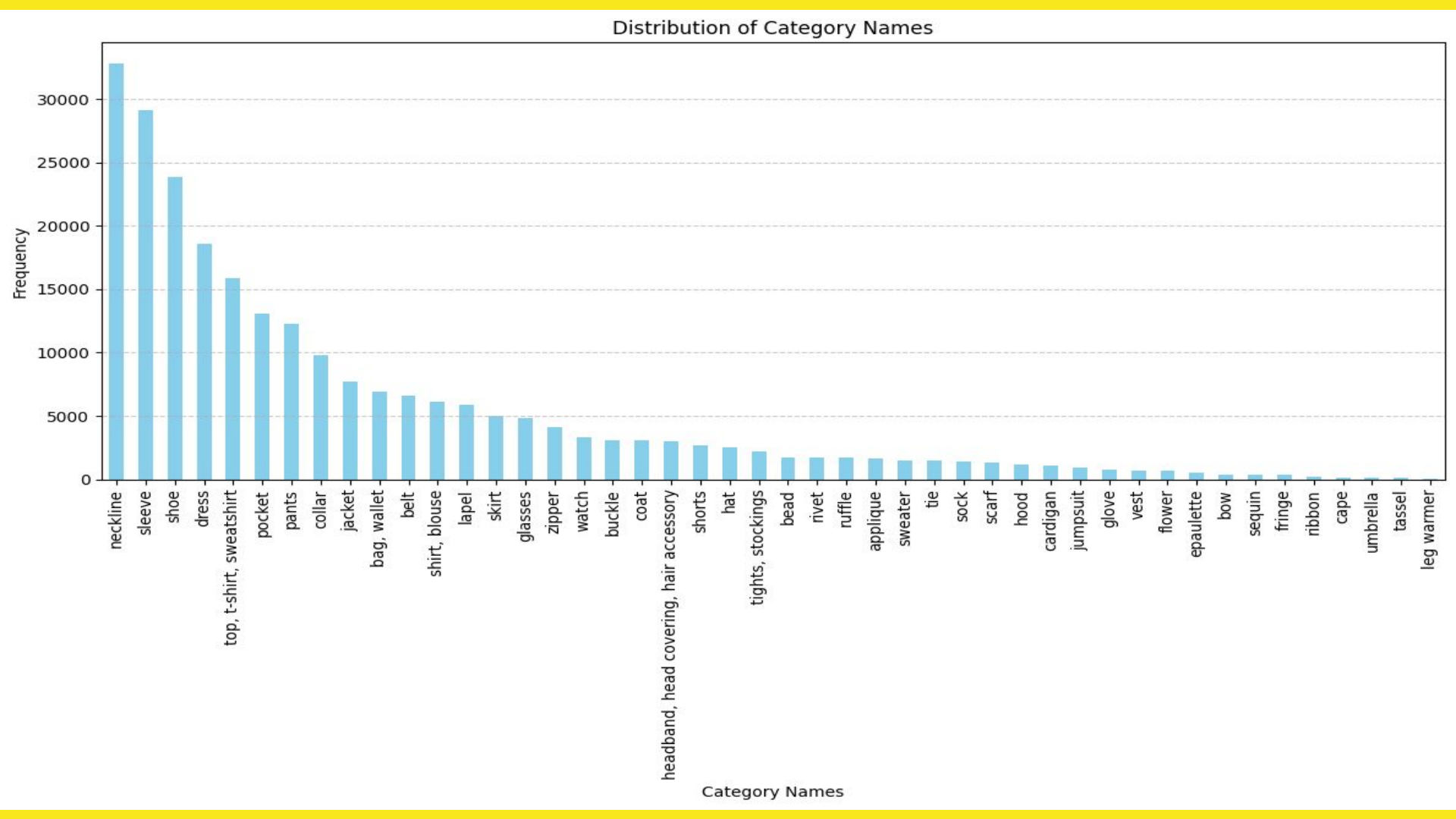
top, t-shirt, sweatshirt
pocket
neckline
pants

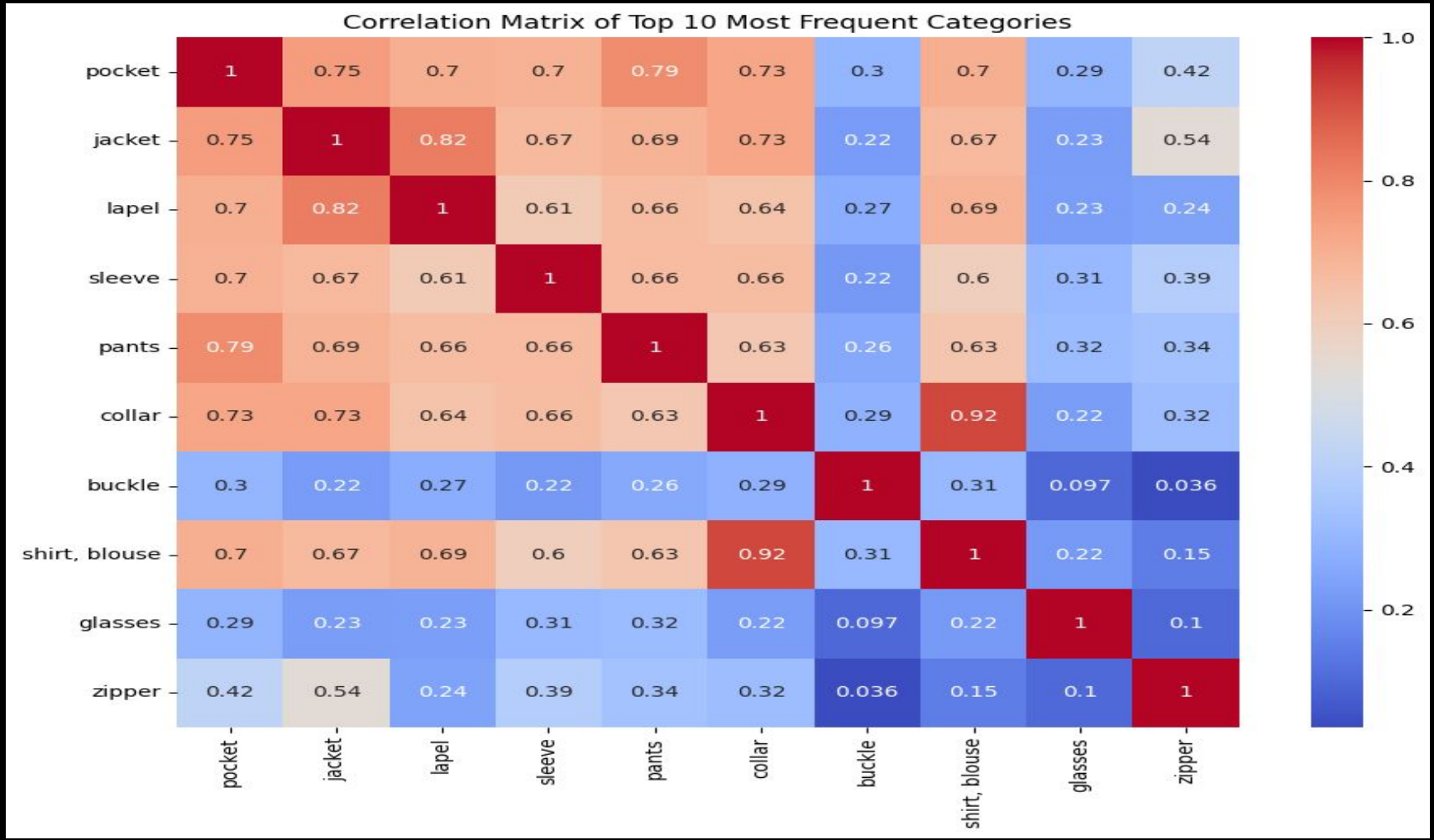
shirt, blouse
hat
tie
collar
lapel
sleeve
pocket
jacket
pants

shirt, blouse
belt
shoe
collar
lapel
sleeve
pocket
buckle
jacket
pants

top, t-shirt, sweatshirt
sweater
sleeve
neckline

jumpsuit
belt
shoe
bag, wallet


Distribution of Category Names
Frequency
0
5000
10000
15000
20000
25000
30000
neckline
sleeve
shoe
dress
top, t-shirt, sweatshirt
pocket
pants
collar
jacket
bag, wallet
belt
shirt, blouse
lapel
skirt
glasses
zipper
watch
buckle
coat
headband, head covering, hair accessory
shorts
hat
tights, stockings
bead
rivet
ruffle
applique
sweater
tie
sock
scarf
hood
cardigan
jumpsuit
glove
vest
flower
epaulette
bow
sequin
fringe
ribbon
cape
umbrella
tassel
leg warmer
Category Names


Correlation Matrix of Top 10 Most Frequent Categories
pocket 1 0.75 0.7 0.7 0.79 0.73 0.3 0.7 0.29 0.42
jacket 0.75 1 0.82 0.67 0.69 0.73 0.22 0.67 0.23 0.54
lapel 0.7 0.82 1 0.61 0.66 0.64 0.27 0.69 0.23 0.24
sleeve 0.7 0.67 0.61 1 0.66 0.66 0.22 0.6 0.31 0.39
pants 0.79 0.69 0.66 0.66 1 0.63 0.26 0.63 0.32 0.34
collar 0.73 0.73 0.64 0.66 0.63 1 0.29 0.92 0.22 0.32
buckle 0.3 0.22 0.27 0.22 0.26 0.29 1 0.31 0.097 0.036
shirt, blouse 0.7 0.67 0.69 0.6 0.63 0.92 0.31 1 0.22 0.15
glasses 0.29 0.23 0.23 0.31 0.32 0.22 0.097 0.22 1 0.1
zipper 0.42 0.54 0.24 0.39 0.34 0.32 0.036 0.15 0.1 1
pocket
jacket
lapel
sleeve
pants
collar
buckle
shirt, blouse
glasses
zipper
1.0
0.8
0.6
0.4
0.2

$$S(i,\ j) = (I * K)(i,\ j) = \sum_m \sum_n I(m,\ n)K(i-m,\ j-n)$$

$$S(i,\ j) = (K * I)(i,\ j) = \sum_m \sum_n I(i-m,\ j-n)K(m,\ n)$$

For a 3*3 kernel size the equation becomes,

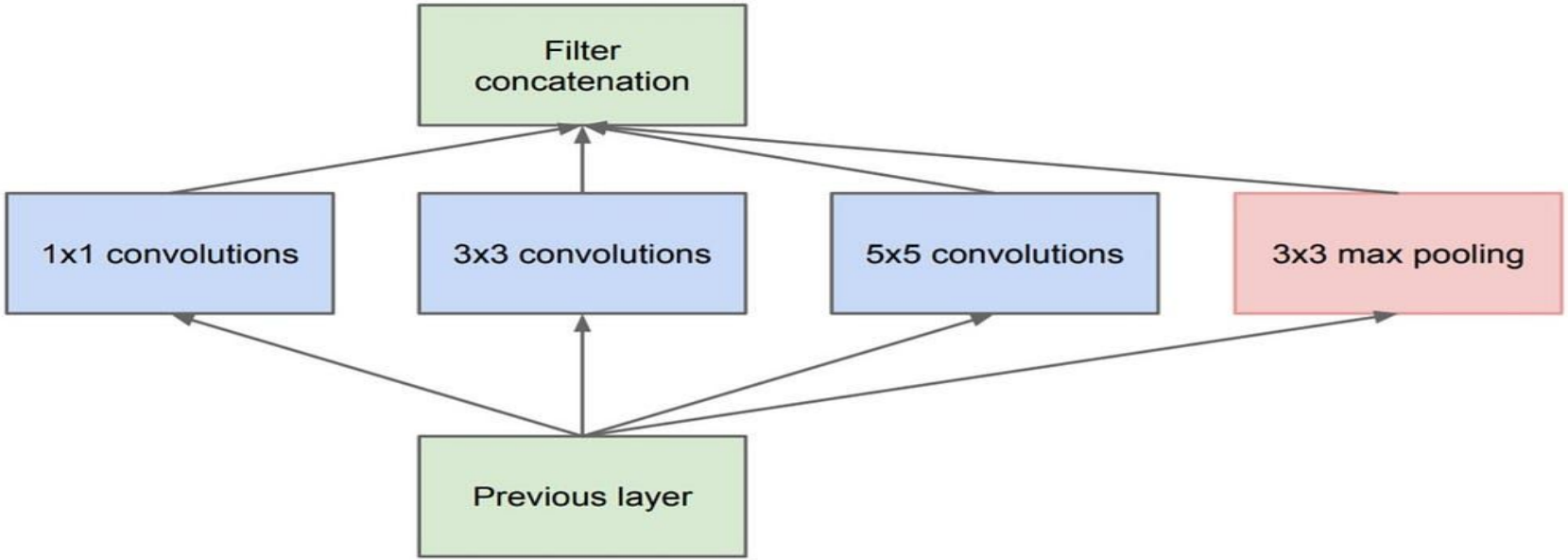
$$S(i,\ j) = (K * I)(i,j) = \sum_{m=1}^{3} \sum_{n=1}^{3} I(i-m,\ j-n)K(m,\ n)$$

$$A(i,\ j) = \begin{cases} 0 & \text{if } S(i,\ j) < 0 \\ S(i,\ j) & \text{if } S(i,\ j) \geq 0 \end{cases}$$

MODELS

- Resnet50
- Inceptionnet
- ViT B 16
- Retinanet_resnet50
- Resnet 101
- CNN

INCEPTION MODULE BASIC ARCHITECTURE



(a) Inception module, naïve version

METRIC

	Accuracy	F1 Score	Precision	Recall
ViT_B_16	0.150348	0.748433	0.784978	0.715139
ResNet_101	0.074455	0.650119	0.690595	0.614126
CNN	0.037504	0.538761	0.67368	0.448866
Inceptionnet	0.02	0.52	0.65	0.34

POST TRAINING ANALYSIS

- Assign class weights to address multilabel imbalance
- FocalLoss loss function
- Regularization (Dropout and residual skip connection)
- Alternate between max pooling and average pooling

DEMONSTRATION

FUTURE WORK AND APPLICATION

- Committee of network
- Add text to image implementation
- Model can identify additional attributes such as color, design etc
- Image segmentation
- Fashion designers bespoke designs for customers