

# FashionMNIST Using Deep Learning



# Team Members

Sakshi Tomar

Abhinav Sharma

Dipanshu Chaudhary



# ABSTRACT

Online fashion market is constantly growing, and an algorithm capable of identifying garments can help companies in the clothing sales sector to understand the profile of potential buyers and focus on sales targeting specific niches, as well as developing campaigns based on the preference of customers and improve user experience. Artificial Intelligence approaches able to understand and label humans clothes are necessary, and can be used to improve sales, or better understanding users. Convolutional Neural Network (CNN) models have been shown efficiency in image classification.

# Introduction



- Fashion MNIST is a dataset that made to help researchers finding models to classify this kind of Product such as clothes, and the paper that describes it presents a comparison between the main classification methods to find the one that better label this kind of data. The main goal of this project is to provide with better efficiency with better comparisons between classification methods.
- In this project we use a Convolutional Neural Network (CNN) approach for this problem and compare the classifications results with the original ones.

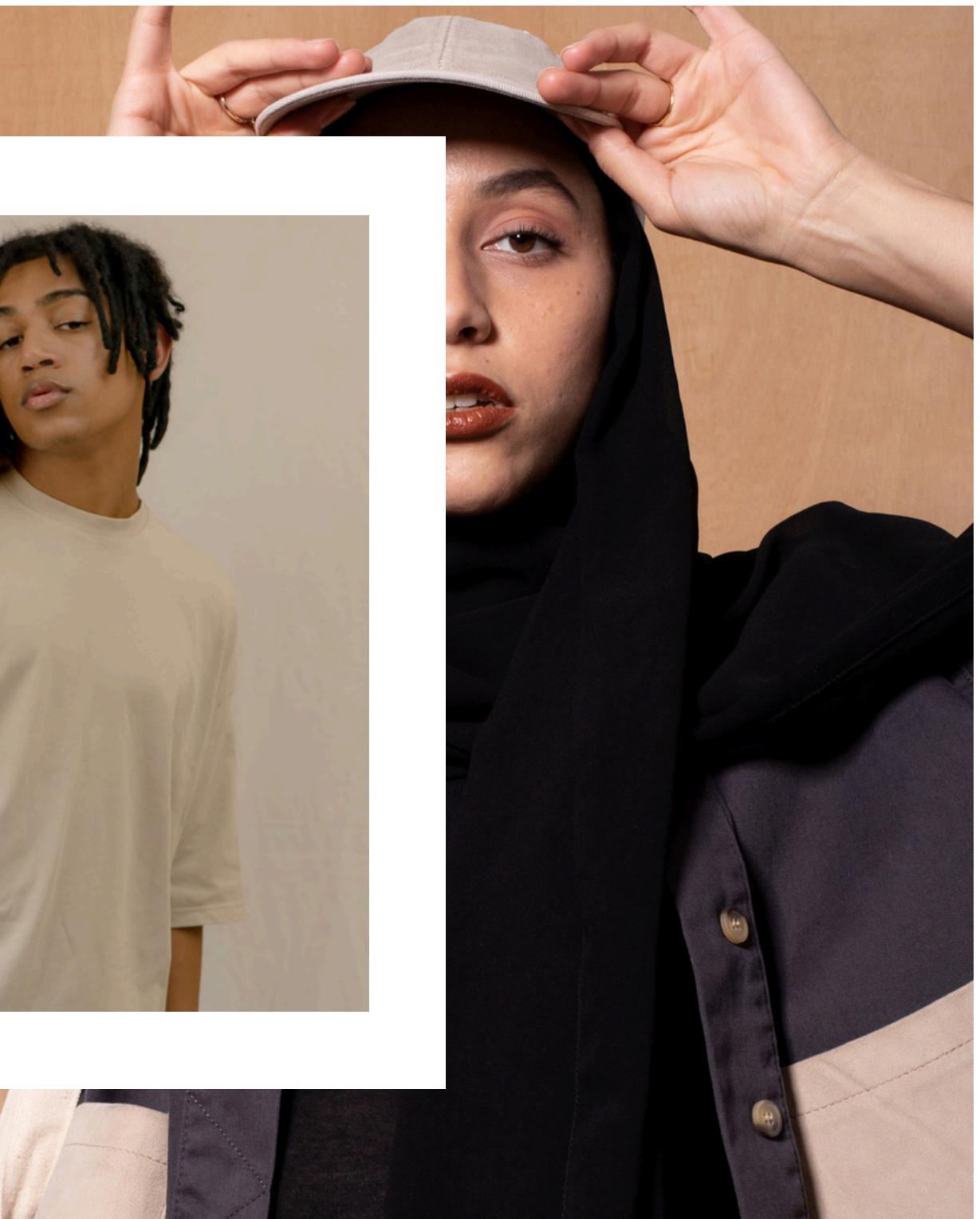


# Dataset Description

- Fashion-MNIST is a dataset of Zalando's article images—consisting of a training set of 60,000 examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image, associated with a label from 10 classes.
- Data-set is publicly available on Kaggle and [Zalando Fashion MNIST repository](#) on GitHub.
- Fashion MNIST is designed as a seamless and direct replacement for the original MNIST dataset, maintaining identical image dimensions and the structure of both training and testing data partitions.

# BUSSINESS IMPACT

• **E-commerce** companies have lots of items for sale online which requires lots of images to be displayed on their websites, applications and on social media. And it takes a lots of human power and time to separate these images into respective groups. This classifier which we are going to build helps in businesses to categorize images into respective groups.



# METHODOLOGY

For this project we will be going to use Deep Learning concepts like Artificial Neural Networks and Convolutional Neural Network to build an image classification model in which will learn to distinguish 10 different item images into their respective categories.

The Fashion MNIST methodology entails gathering data, preprocessing it (normalizing pixel values, splitting datasets), choosing and creating an appropriate model (usually Convolutional Neural Networks), training on the training set and validating it on a different validation set, optimizing hyperparameters for best performance, deploying

the model for predictions, iteratively improving it through changes to the architecture or methods like data augmentation, and finally documenting and reporting the results. For the purpose of accurately classifying clothing items, this structured approach guarantees efficient handling of the dataset, model development, optimization, and evaluation.

# Objective

**HIGH CLASSIFICATION ACCURACY:** IDENTIFY DIFFERENT FASHION ITEMS FROM THE IMAGES WITH ACCURACY, ENSURING THAT EACH IMAGE IS CORRECTLY ASSIGNED TO THE APPROPRIATE CLOTHING CATEGORY BY THE MODEL.

**EFFICIENCY AND SCALABILITY:** CREATE MODELS THAT ARE BOTH SCALABLE AND EFFICIENT IN THE USE OF COMPUTATIONAL RESOURCES. THIS WILL ENABLE THEM TO BE EASILY EXTENDED TO HANDLE LARGER DATASETS OR OTHER VARIANTS OF THE FASHION CLASSIFICATION PROBLEM.

**ENHANCED GENERALIZATION:** REDUCE OVERFITTING TO GIVE A MODEL'S PERFORMANCE ON CLEAN, UNTESTED DATA TOP PRIORITY. TO INCREASE ROBUSTNESS, THIS ENTAILS USING METHODS LIKE NORMALIZATION AND DATA AUGMENTATION.

# Remarks

Fashion MNIST is a benchmark dataset for deep learning that enables practitioners to use cutting-edge methods for image classification. Convolutional Neural Networks (CNNs), in particular, are useful for deep learning applications because they can extract complex patterns from images. The standardized nature of the dataset makes model comparison and algorithm evaluation easier. Nevertheless, model complexity can lead to overfitting even with high accuracy, requiring regularization methods like batch normalization or dropout. Moreover, model robustness is improved by expanding the dataset through transformations. Fashion MNIST is a fundamental tool for exploring, validating, and refining deep learning architectures and methodologies for image classification tasks, despite its simplicity when compared to real-world datasets.



# CONCLUSION

Depending on the model architecture, hyperparameters, and optimization strategies, different outcomes are obtained when applying deep learning models, in particular Convolutional Neural Networks (CNNs), on the Fashion MNIST dataset. On the test set, one can typically achieve high accuracy rates with CNNs, ranging from 85% to over 95%. Accuracy levels can be raised to 95% or higher with the help of sophisticated architectures, regularization, and data augmentation. However, particular outcomes may vary based on the complexity, length of training, and improving of the model.



THANKS!