Case Study: Mask identification at bank

A popular bank has implemented a facial recognition system at their entrance to authenticate customers before they can enter the building. However, due to the COVID-19 pandemic, more and more people have started wearing face coverings like surgical masks, which makes it difficult for the facial recognition system to accurately identify them. As a result, the bank is experiencing increasingly high rates of false rejections. To address this issue, bank has decide d to develop a reliable solution that can detect whether someone is wearing a mask or not, so that the facial recognition system can still work effectively.

So the data science team took up this task, to design and implement a real-time mask detection algorithm using that can accurately distinguish between a person without mask and one who is wearing a mask. Team must ensure that their algorithm runs efficiently on a standard PC, consumes minimal computing resources and memory. Additionally, the accuracy of the model should exceed

95%. Finally, algorithm must be able to handle variations in lighting conditions, head pose, occlusions, resolution changes, etc., while maintaining acceptable levels of precision and recall.

To achieve these objectives, the data science team will build a Convolutional Neural Network (CNN) model inspired by architectures such as VGG16, VGG19, or Xception. These established architectures have demonstrated effectiveness in image classification tasks and can serve as a solid foundation for the mask detection algorithm. By leveraging the capabilities of these models, the team aims to develop a highly accurate and efficient mask detection solution that meets the bank's requirements and seamlessly integrates with its existing infrastructure.

Following the development of the CNN model, the evaluation step will be conducted to assess its performance. This evaluation will involve splitting the dataset into training and testing sets, using techniques such as cross-validation to ensure robustness. The performance metrics considered will include accuracy, precision and recall with a specific focus on achieving metrics exceeding the 98% threshold established by the bank. Additionally, the model's performance will be evaluated on its ability to handle various environmental factors and scenarios, ensuring its practical effectiveness in real-world settings.

The ultimate goal is to develop a mask detection algorithm that enhances the security and efficiency of the bank's facial recognition system, adapting to the new normal of mask-wearing in public spaces while maintaining high performance and reliability.

About the dataset

Data Set contains two folders named as Train and Test. Within each of these fol ders there are 2 different folders WithMask and WithoutMask. WithMask folder contains grayscale images of faces with mask. WithoutMask folder contains gra yscale images of faces with without mask. All images are of resolution 28x28.