**Paper 1 - Face Recognition in the Context of Website Authentication**

**Authors -Mohamad Amir Dliwati , Dinesh Kumar**

**Year – 2021**

**Methodology**:

* The paper focuses on developing a security system for website authentication using face recognition techniques based on machine learning and deep learning.
* The process includes three main tasks:
  + Face detection using the P. Viola & M. Jones method.
  + Feature extraction using various methods, including PCA.
  + Classification using algorithms like Decision Trees, Support Vector Machines (SVM), Random Forest, and deep learning techniques such as InceptionV3.
* The InceptionV3 algorithm was specifically used to classify faces, trained on a dataset collected from various sources.

**Technologies Used**:

* **Machine Learning & Deep Learning**: Principal Component Analysis (PCA), SVM, Logistic Regression, InceptionV3.
* **Programming**: Python.
* **Libraries**: TensorFlow, Scikit-learn.
* **Dataset**: Collected from internet resources, including Kaggle, containing 13,668 images of 1409 individuals.

**Observations**:

* Logistic Regression, when used with deep learning, performed better than traditional machine learning algorithms for face recognition.
* The dataset's diversity and complexity can influence the effectiveness of the face recognition system.

**Remarks**:

* The study demonstrates the superiority of deep learning-based methods (like Logistic Regression with deep learning) over traditional machine learning techniques for face recognition.
* Future work aims to improve accuracy by diversifying the dataset and exploring new deep learning architectures with hyperparameter tuning.

**Paper 2 - Face Anti-spoofing Based on Convolutional Neural Networks**

**Author - Siyamdumisa Maphisa, Duncan Coulter**

**Year - 2022**

* **Methodology**:
  + The study proposes an anti-spoofing model for face recognition systems using three different pipelines based on Convolutional Neural Networks (CNNs):
    - A baseline CNN with hyperparameter tuning.
    - An AlexNet-based CNN.
    - A VGG16-based CNN.
  + The pipelines are trained and tested using the NUAA and CelebA datasets to identify and prevent face spoofing attacks such as photo, video, and mask attacks.
  + Performance metrics like accuracy, precision, recall, F1 score, AUC, and ROC curve were used for evaluation.
  + Preprocessing steps included face detection using Haar cascades, data augmentation, noise removal using the GrabCut algorithm, and resizing images.
* **Technologies Used**:
  + **Deep Learning**: CNN, AlexNet, VGG16.
  + **Programming**: Python using Google Colaboratory and PyCharm.
  + **Libraries**: Keras, OpenCV, Scikit-learn.
  + **Datasets**: NUAA and CelebA datasets.
* **Observations**:
  + The Baseline CNN performed better on the NUAA dataset, while its performance decreased on the more complex CelebA dataset.
  + The VGG16 model showed consistent performance across both datasets, highlighting its robustness.
  + The complexity of the dataset affects the performance of the models, indicating a need for more sophisticated datasets for future benchmarking.
* **Remarks**:
  + The VGG16 architecture was found to be the most effective in this study.
  + The study suggests using more sophisticated databases and ensemble learning techniques in the future to enhance model performance.