



# DSCI-6011-02 DEEP LEARNING

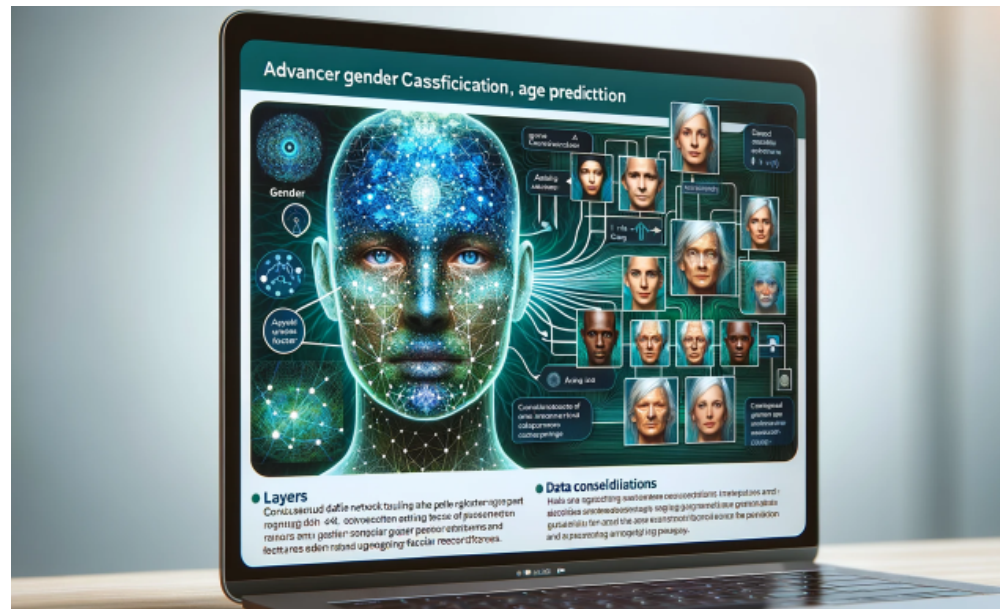
## TERM PROJECT – PROJECT PROPOSAL

by

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# PROJECT TITLE

## GENDER CLASSIFICATION AND AGE PREDICTION USING DEEP LEARNING



# STATEMENT OF PROJECT OBJECTIVES

- Develop Deep Learning models that can accurately classify Single Object Images based on the gender of an individual in the image and also predict the age of that person.
- Deep Learning Architectures like Convolutional Neural Network, ResNet, VGG, GoogleNet will be used to develop the Deep Learning models.
- The Age prediction task will be treated as a Regression problem.
- Another set of Deep Learning models will be developed using Preprocessed dataset images to do the same tasks.
- Preprocessing is done to remove noise from dataset images which could reduce the false predictions and improve model accuracy.
- Another important objective of this project is to check if preprocessing of dataset images improves the model accuracy or not.

# WHAT'S NEW IN THIS PROJECT ?

## Preprocessing of Dataset images

- Models built with image processing often face the effect of noise resulting underfitting and low accuracy.
- So, a preprocessing step like noise filtering can be done to reduce the effect of noise which smoothens the feature extraction process and eventually building a model with high accuracy.
- Noise filtering of dataset images can be done with Gaussian, Mean, Median or Weiner filters and then the model building and evaluation process can be carried.
- This is done to check if the preprocessing step helps in building a more accurate model or not.

# STATEMENT OF VALUE

- Gender and Age are demographic details which are important in many fields.
- These models can be used for Video Surveillance where it is important to identify the gender and predict the age of an individual for security reasons.
- In the Medical and Health sector, age prediction and gender information helps in early diagnosis and treatment of age-related diseases.
- In the Business and Marketing field, Profile demographical data is needed to categorize users and take decisions targeting specific gender and age group.

# REVIEW OF STATE OF THE ART AND RELEVANT WORKS

- For the Deep Learning Model building:

Sheoran, V., Joshi, S., Bhayani, T.R. (2021). Age and Gender Prediction Using Deep CNNs and Transfer Learning. In: Singh, S.K., Roy, P., Raman, B., Nagabhushan, P. (eds) Computer Vision and Image Processing. CVIP 2020. Communications in Computer and Information Science, vol 1377. Springer, Singapore. [https://doi.org/10.1007/978-981-16-1092-9\\_25](https://doi.org/10.1007/978-981-16-1092-9_25)

- For Preprocessing of Dataset Images:

<https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/en/covidwho-1280209>

# APPROACH

- Dataset: 5 V's of Data; Volume, Variety, Velocity, Veracity, Value are checked to ensure right set of data is collected for the problem statement.
- <https://susanqq.github.io/UTKFace/>
- The dataset consists of 20000 face images with age, gender, ethnicity as the features. It has an age span of 0 to 116 years. It is a structured, labeled dataset.
- Deep Learning Models: CNN, ResNet, VGG, GoogleNet
- Tools: Tensorflow, Keras, Numpy, Pandas
- Techniques: Preprocessing, Exploratory Data Analysis, Normalization, Feature Extraction, Model building and Evaluation.

# DELIVERABLES

The deliverables for this project include:

- A fully trained Deep Learning Model capable of Gender classification and Age prediction from the given input images.
- A comprehensive report detailing the development process, methodologies used and performance metrics.
- A Dataset compilation used for training and testing, including preprocessing scripts.
- For future access and replicability, all coding scripts will be provided along with documentation.



# EVALUATION METHODOLOGY

## **For Image Preprocessing:**

- Peak Signal to Noise Ratio: For measuring the quality between the original and compressed images.
- Structure Similarity Index: Used for predicting the perceived quality of the dataset images.

## **For Gender Classification:**

- Accuracy: The percentage of total correct predictions out of all predictions made.
- Precision: The ratio of true positive predictions to the total number of positive predictions.
- Recall: The ratio of true positive predictions to the total number of actual positives.
- Confusion Matrix: A table that allows visualization of the performance of the algorithm, including true positives, false positives, true negatives, and false negatives.

## **For Age Prediction:**

- Mean Absolute Error (MAE): This is the average of the absolute differences between the predicted ages and the actual ages.
- Mean Squared Error (MSE): This is the average of the squared differences between the predicted and actual ages.
- R-squared: This metric indicates the proportion of the variance in the dependent variable (age) that is predictable from the independent variables.

**THANK YOU!**