PERSON IDENTIFICATION USING EAR BIOMETRICS

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CONTENTS

INTRODUCTION

- Identification through biometrics play a very important role in identifying humans by self-personality.

- Ear of every individual is unique and can be used as a biometric to overcome the limitations of the biometrics used today.

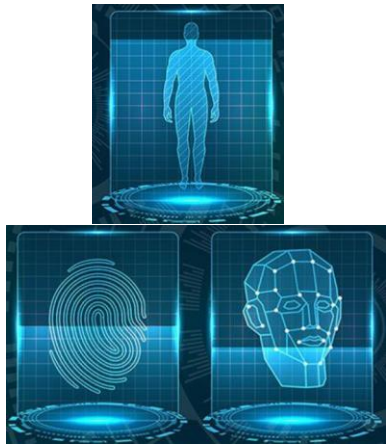
INTRODUCTION

LIMITATIONS IN EXISTING SYSTEMS

- Facial recognition often yield inaccurate results by signs of aging or event of facial surgery, makeup, beard or due to change in expression.

- Iris recognition systems are not accurate if the subject is wearing lenses and glasses.

- Fingerprints recognition doesn't quiet work in an event of burns in fingers.



INTRODUCTION

ADVANTAGES IN EAR BIOMETRICS

- Human ear overcomes almost all the limitations of the biometrics used today.
- It cannot be disturbed by makeup, facial hair, glasses or due to facial expression.
- It contains abundant structure features that are permanent.
- Unlike face, ear biometric has been utilized to recognize identical twins because of its discriminant characteristics.

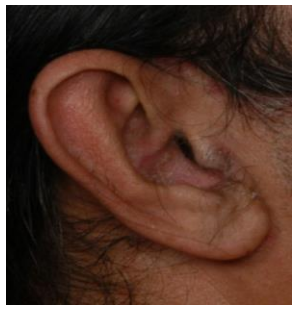
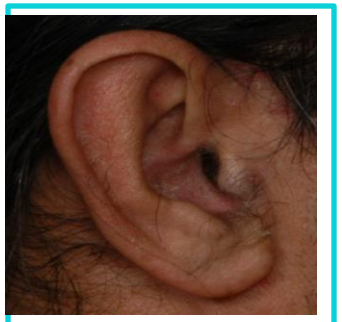
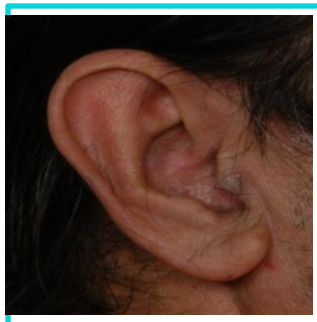
DATASET

AMI EAR DATASET

- NUMER OF SUBJECTS- 100
- SAMPLES PER SUBJECT– 7
- TOTAL IMAGES – 700

DATASET

AMI EAR DATASET

UP	DOWN	FRONT	ZOOM	BACK	LEFT	RIGHT
						

SAMPLES PER PERSON – 7

PREPROCESSING TECHNIQUES

➢GRAYSCALE CONVERSION

Information is given by edges being robust to lighting changes. Pixel intensity and position are used to compute the pixel distance.

ORIGINAL

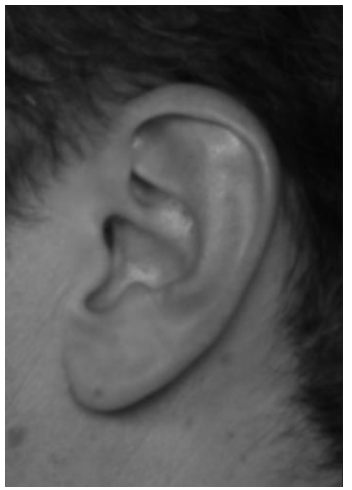
GRAYSCALE

PREPROCESSING TECHNIQUES

➢GAUSSIAN BLUR

It is the result of blurring an image using Gaussian function to reduce image noise and detail.

ORIGINAL



GAUSSIAN BLUR

PREPROCESSING TECHNIQUES

➢CANNY EDGE DETECTOR

AN edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images.

ORIGINAL

CANNY EDGE DETECTION

IMPLEMENTATION

Transfer Learning Models – InceptionV3 and Resnet152V2 are used to train and test over the entire normal dataset and grayscale converted dataset using different activation functions.

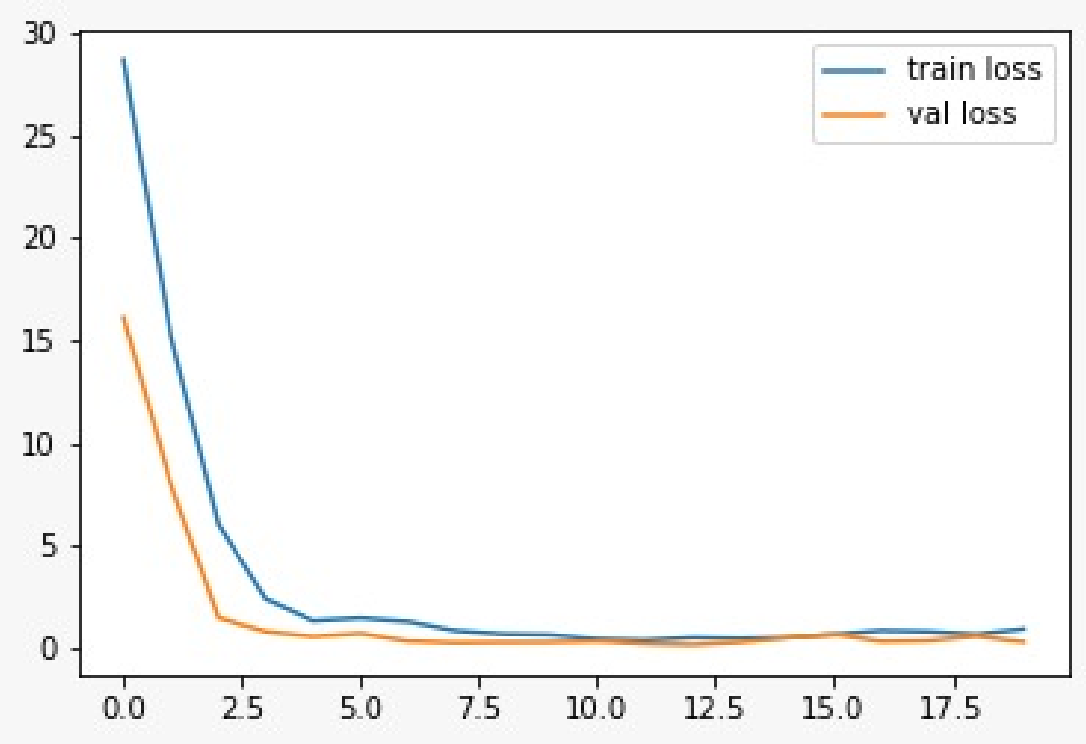
RESULTS AND ANALYSIS

ACTIVATION FUNCTION - SOFTMAX

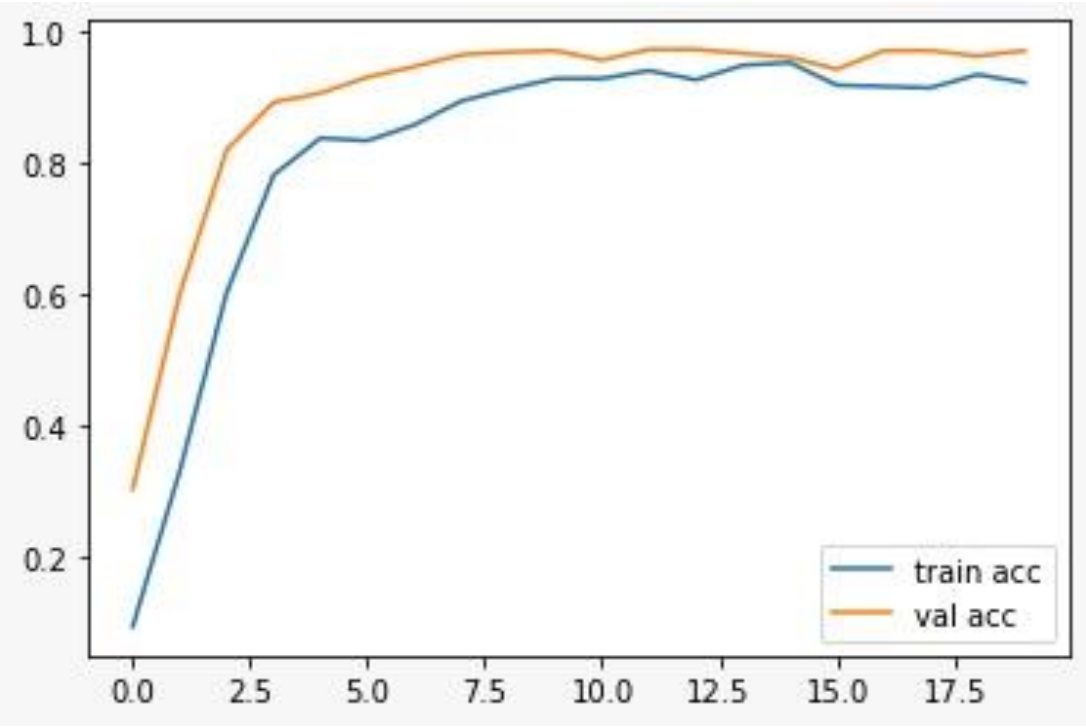
MODEL \ DATASET	NORMAL DATASET	GRAYSCALE DATASET
InceptionV3	94.86	97.56
Resnet152V2	98.43	98.79

RESULTS AND ANALYSIS

InceptionV3 Model Curves (on grayscale dataset)
Activation Function - softmax



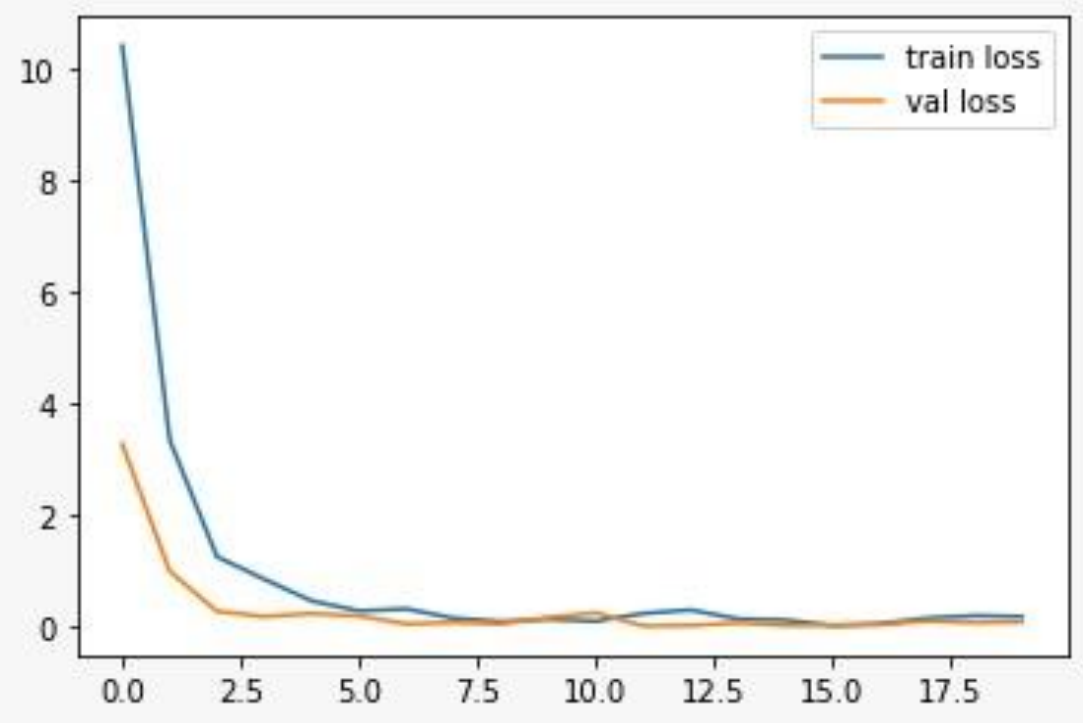
Loss Curve



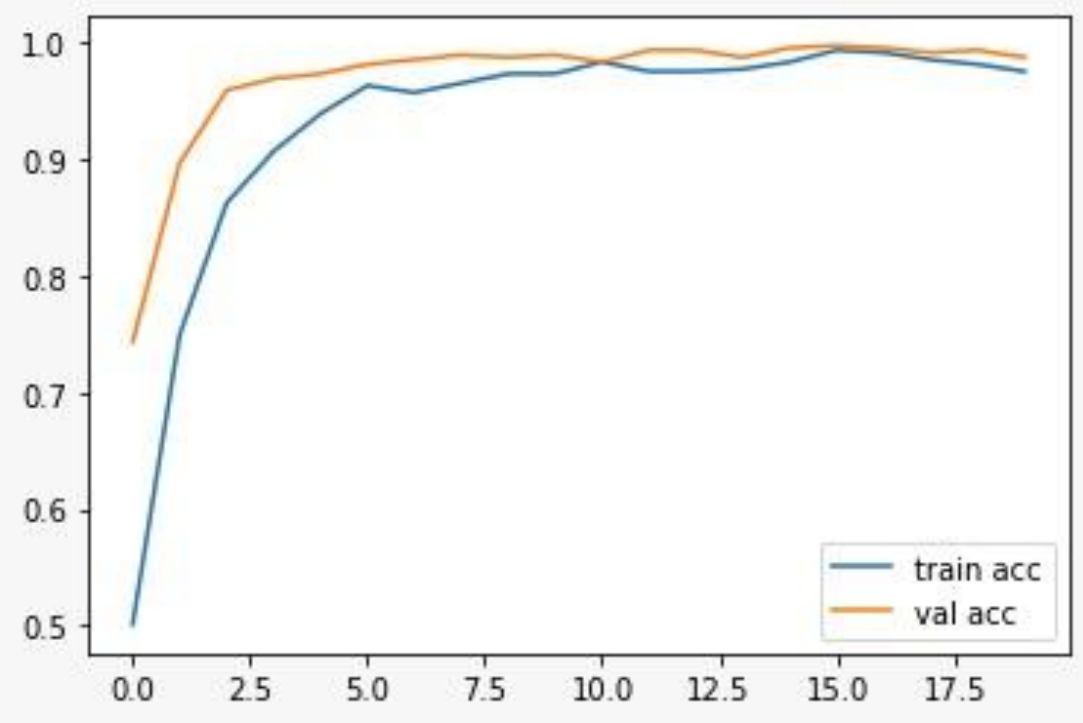
Accuracy curve

RESULTS AND ANALYSIS

Resnet152V2 Model Curves (on grayscale dataset)
Activation Function - softmax



Loss Curve



Accuracy curve

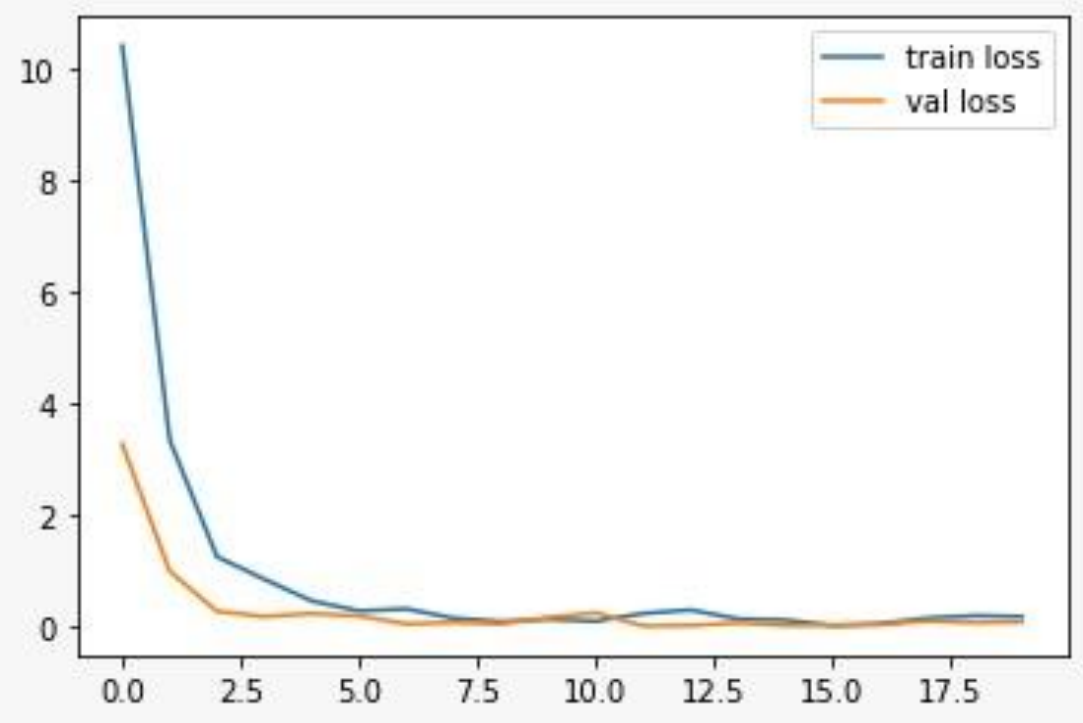
RESULTS AND ANALYSIS

ACTIVATION FUNCTION - SIGMOID

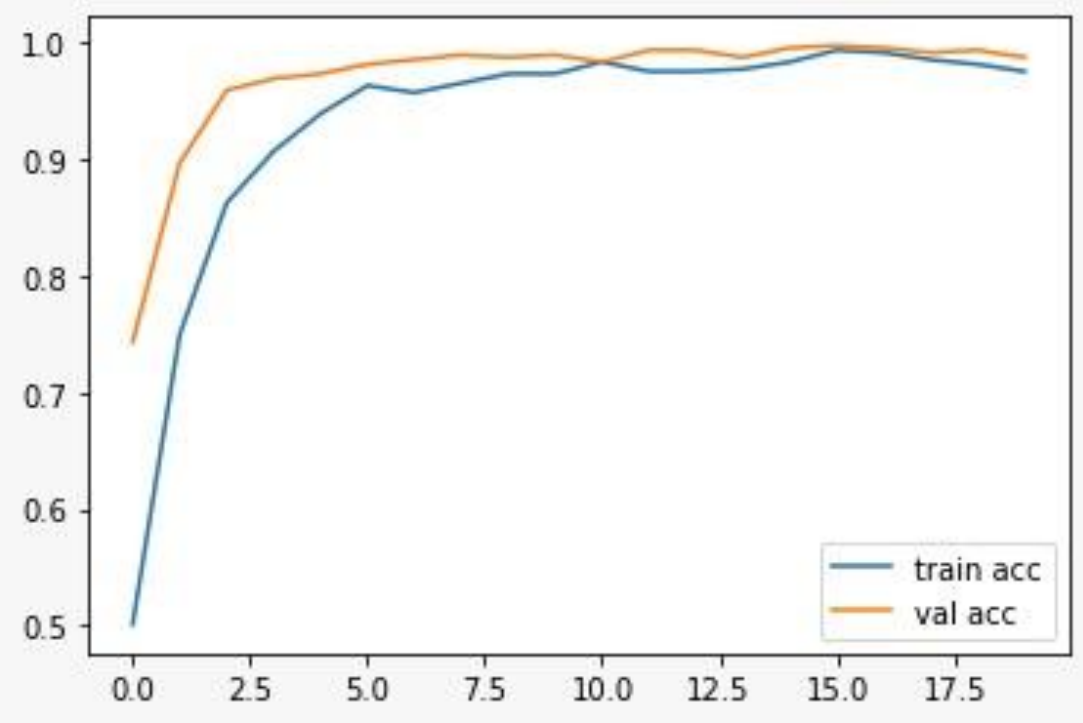
MODEL \ DATASET	NORMAL DATASET	GRAYSCALE DATASET
InceptionV3	94.89	99.19
Resnet152V2	98.43	98.79

RESULTS AND ANALYSIS

Resnet152V2 Model Curves (on grayscale dataset)
Activation Function - Sigmoid



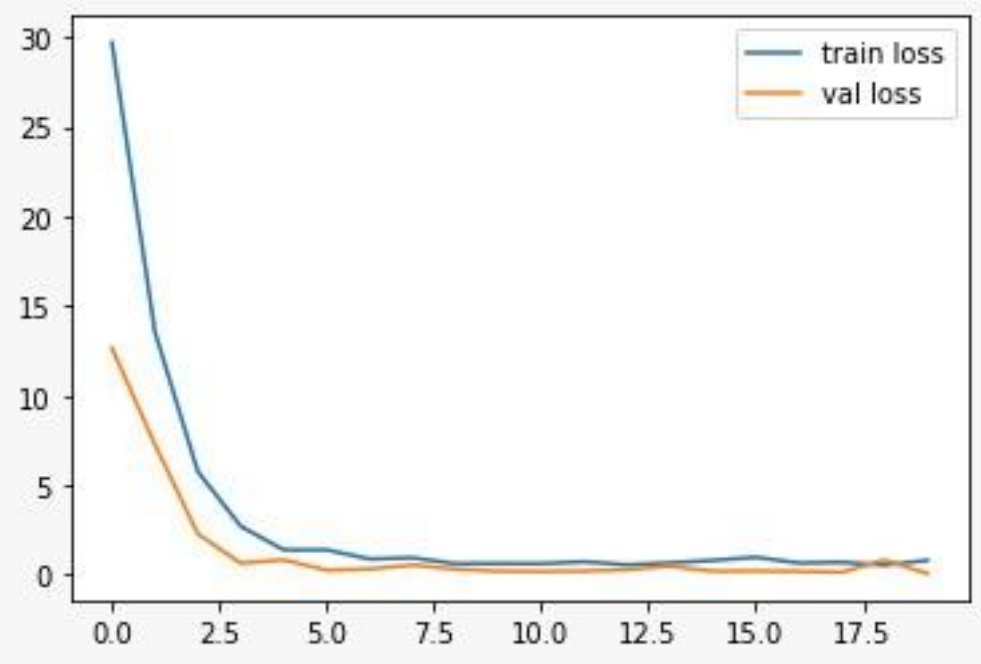
Loss Curve



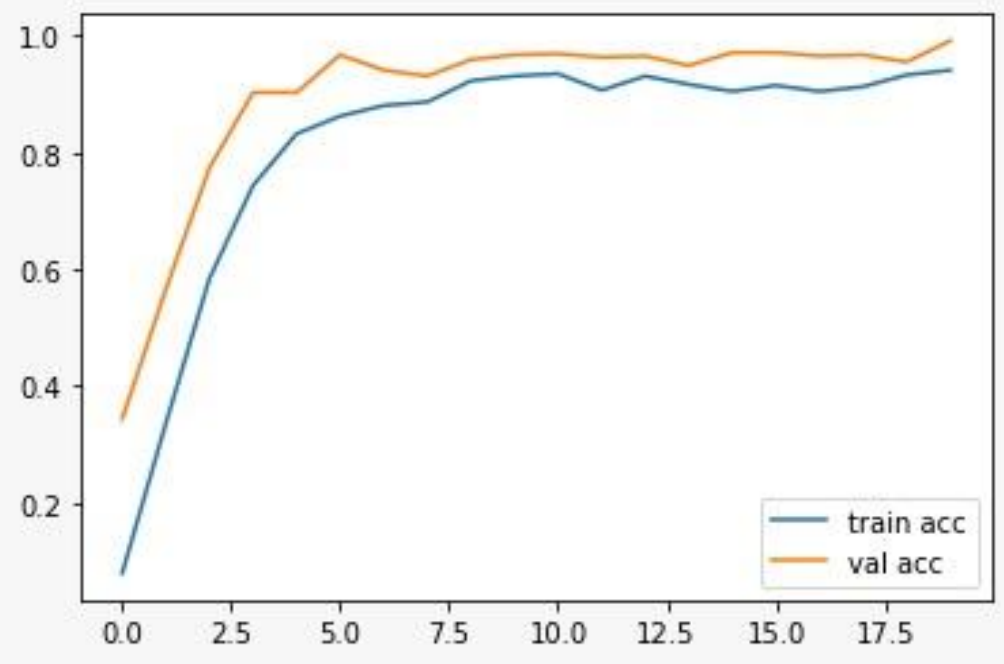
Accuracy curve

RESULTS AND ANALYSIS

InceptionV3 Model Curves (on grayscale dataset)
Activation Function - Sigmoid



Loss Curve



Accuracy curve

CONCLUSION

From the above results, it is concluded that the best accuracy for the Ear biometrics system is achieved with InceptionV3 model (activation function – sigmoid) using grayscale converted dataset with attained accuracy of 99.19%.

CHALLENGES

- Occlusion by hair, cloth, spectacles or earring is possible.
- Person might be wearing earphones or headphones.
- Person might be carrying a hearing machine.

FUTURE WORK

- Applying preprocessing techniques and feature extraction.
- Implementing more models and testing for best accuracy results.
- Deploying the model to be served with user– interface.

REFERENCES

- Nikose, Shruti, and Hemant Kumar Meena. "Ear-biometrics for human identification." 2020 Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA). IEEE, 2020.

- Tian, Liang, and Zhichun Mu. "Ear recognition based on deep convolutional network." 2016 9th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI). IEEE, 2016.

Thank You

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