

Generalized Iris Presentation Attack Detection Algorithm under Cross-Database Settings

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Motivation

Vulnerability of iris recognition algorithms towards presentation attacks is a serious concern.

Even with the rich literature of presentation attack detection, the problem of generalizability across multiple datasets, sensors and experimental conditions still remains an open problem.

In this research, we propose a algorithm to develop a generalized solution under cross-database evaluation.

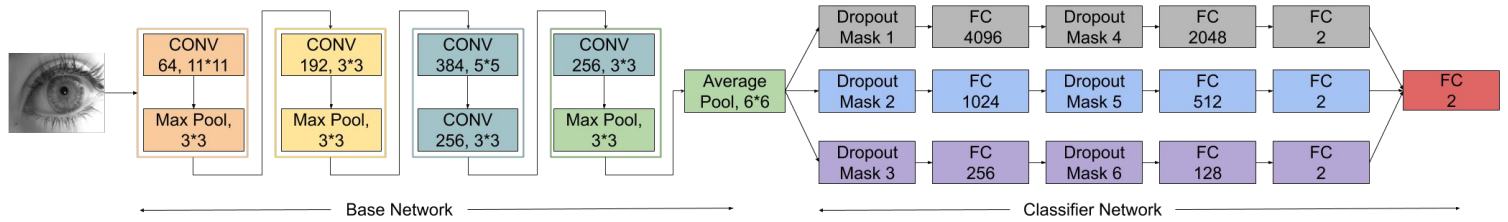
Iris PAD Databases

Database	Real	Spoof	Sensors	Environment
IIIT-CLI [1]	2163	2165	2	Controlled
MUIPAD [2]	1719	1713	1	Uncontrolled
UnMIPA [3]	9319	9387	3	Uncontrolled

Characteristics of the iris PAD databases.

[1] Yadav et al., TIFS 2014, [2] Yadav et al., WACV 2018, [3] Yadav et al., CVPRW 2019

Proposed Generalized Iris Presentation Attack Detection Network: MVANet



Experimental Setup

- Evaluation Metrics: APCER, BPCER, and ACER
- Experimental Setting: The experiments are performed using intra (same) and inter-database scenarios.
- In intra-database setting the database is divided into 50-50% train and test split.
- In inter-database one database is used for training while other databases are used for evaluation.

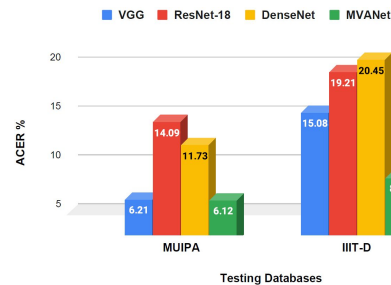
Intra-Database Experimental Results

Algorithm	Cogent	Vista
VGG	90.40	94.82
ResNet18	85.15	80.97
DenseNet	84.32	91.83
Textural Features	55.53	55.53
Weighted LBP	65.40	66.91
LBP + SVM	77.46	77.46
LBP+PHOG+SVM	75.80	74.45
mLBP	80.87	83.91
MVANet	94.90	95.11

The IPAD networks are trained on IIITD-CLI database.

The proposed MVANet outperforms both hand-crafted texture based and deep CNN based iris presentation attack detection algorithms.

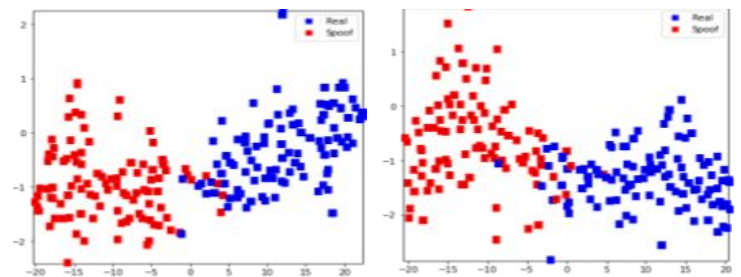
Inter-Database Experimental Results



The IPAD networks are trained on UnMIPA database.

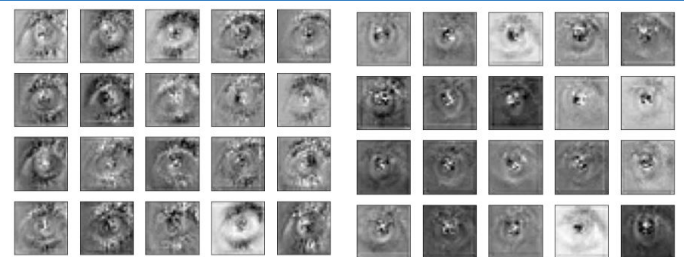
The deeper CNN models shows higher error as compared to shallow models.

Analysis



TSNE plots for different branches of classifier on 100 iris images, depicting the differences between each branch

Analysis



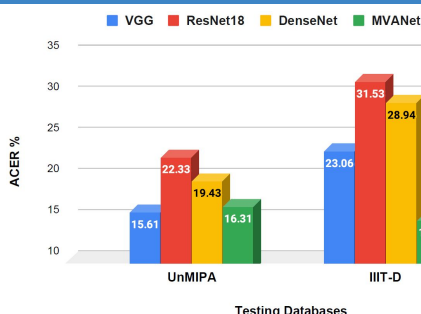
Filter maps on spoof images

Filter maps on real images

Acknowledgement

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Inter-Database Experimental Results



Training is performed using MUIPA database.

The performance of MVANet is at-least 8% better than CNN models.