



ZAKA

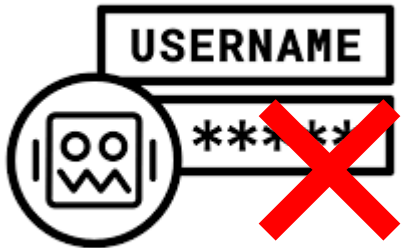
AIC – Summer 2022

Document Liveness Detection

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Our Mission



Live?

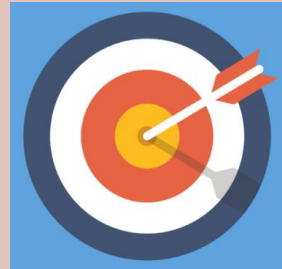
Just a Copy?

- Gray Copy
- Colored Copy
- Recaptured Copy

Challenge



Reliability



Accuracy
FAR / FRR



Computing
Resources

Dataset

DLC-2021

(Document Liveness Challenge – 2021)

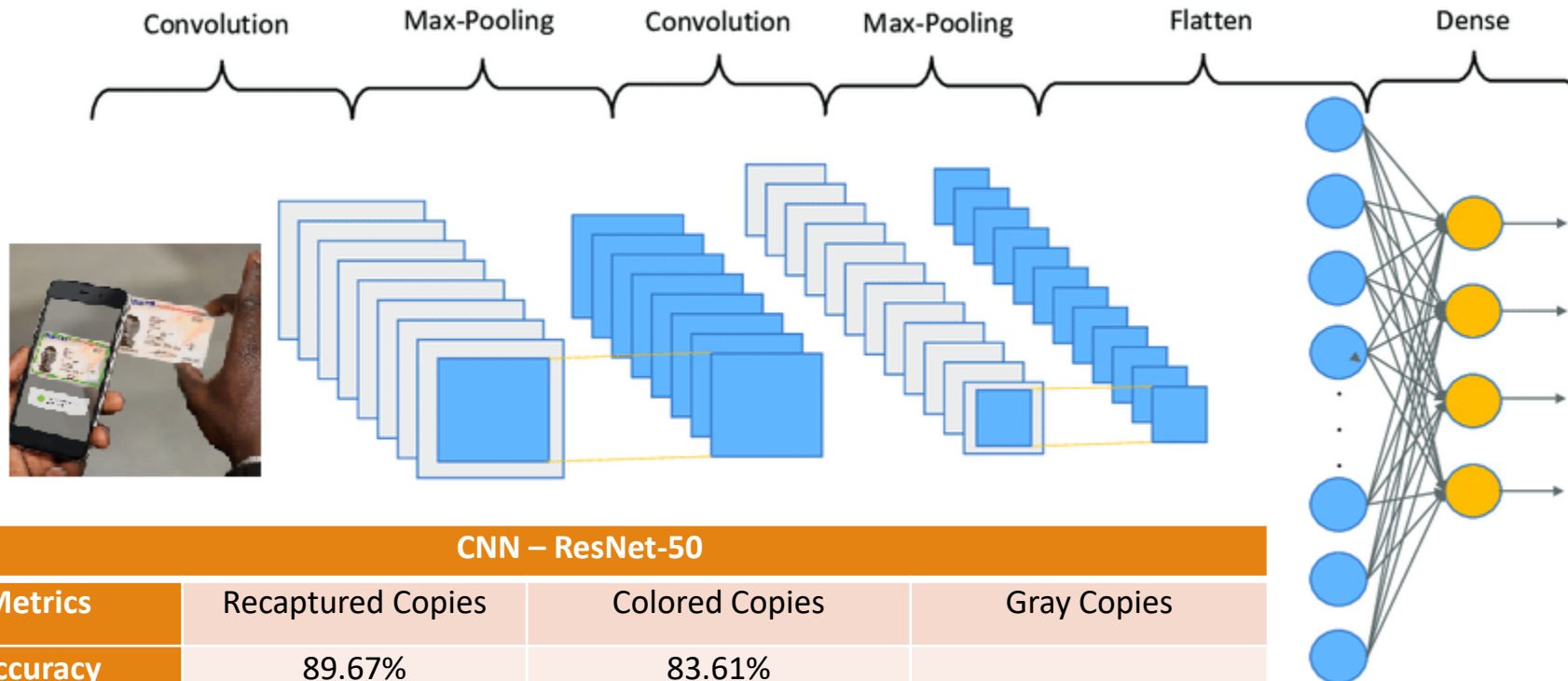
Ethical

Complies with the GDPR

Serving the
Target

Contains all required categories (or, cc, cg ,re)

Previous Solutions: CNN (ResNet-50)



CNN – ResNet-50			
Metrics	Recaptured Copies	Colored Copies	Gray Copies
Accuracy	89.67%	83.61%	Failed
Precision	85.89%	96.01%	
Recall	89.03%	85.56%	



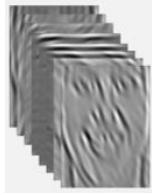
What about Gray Copies?

How we tackled the problem?



- Frames Extraction
- Image Handling
- Background Removal

Preprocessing



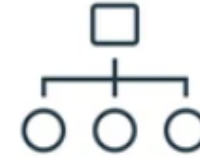
- Local Features
- Raw Pixels Data
- Global Features

**Features
Extraction**



- Clustering (BoF)
- PCA

**Data
Optimization**



- SVM
- Log. Regression
- XGBoost
- Random Forest

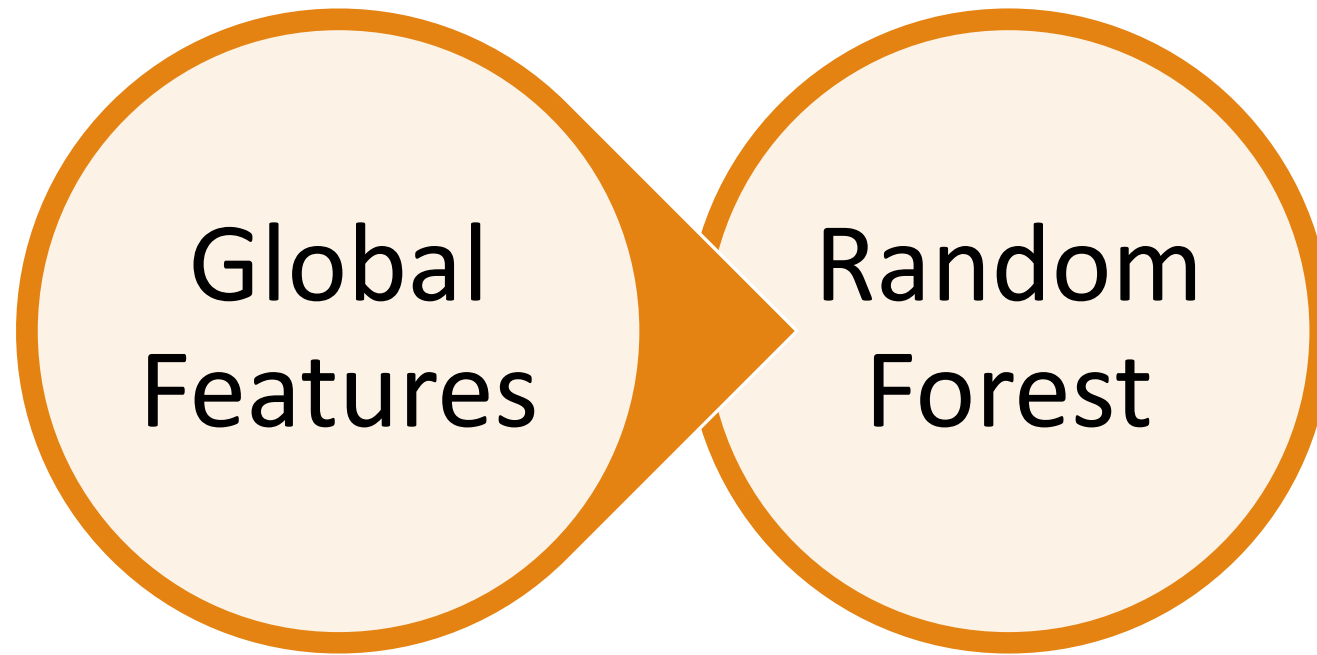
Classification



- Accuracy
- FAR & FRR

Evaluation

Our Proposed Solution



Global Features Extraction focus:

- ✓ **Shape** (HuMoments)
- ✓ **Color** (HSV + CalcHist)
- ✓ **Texture** (Haralick)

Results

- Reliability: Training Performed on all dataset categories (or, cc, cg and re)
- Accuracy: 94.8%

Classification Report

	precision	recall	f1-score	support
0	0.98	0.92	0.95	243
1	0.91	0.98	0.95	216
accuracy			0.95	459
macro avg	0.95	0.95	0.95	459
weighted avg	0.95	0.95	0.95	459

Confusion Matrix

223 (TN)		20 (FP)
4 (FN)		212 (TP)

- FAR & FRR:

$\text{FAR} = 1 - \text{TNR} = 1 - \text{Specificity} = 8.23\%$

$\text{FRR} = 1 - \text{TPR} = 1 - \text{Recall} = 1.85\%$

Results after Threshold Tuning

- Threshold: **0.72**
- Accuracy: 89.17%

Classification Report

	precision	recall	f1-score	support
0	0.98	0.92	0.95	243
1	0.91	0.98	0.95	216
accuracy			0.95	459
macro avg	0.95	0.95	0.95	459
weighted avg	0.95	0.95	0.95	459

Confusion Matrix

243 (TN)		0 (FP)
50 (FN)		166 (TP)

- FAR & FRR:

$\text{FAR} = 1 - \text{TNR} = 1 - \text{Specificity} = 0.0\%$

$\text{FRR} = 1 - \text{TPR} = 1 - \text{Recall} = 24.15\%$

Results after Threshold Tuning

- Threshold: **0.8**
- Accuracy: 78.43

Classification Report

	precision	recall	f1-score	support
0	0.71	1.00	0.83	243
1	1.00	0.54	0.70	216
accuracy			0.78	459
macro avg	0.86	0.77	0.77	459
weighted avg	0.85	0.78	0.77	459

Confusion Matrix

243 (TN)		0 (FP)
99 (FN)		117 (TP)

- FAR & FRR:

$\text{FAR} = 1 - \text{TNR} = 1 - \text{Specificity} = 0.0\%$

$\text{FRR} = 1 - \text{TPR} = 1 - \text{Recall} = 45.83\%$

Deployment



Note: New samples – from outside the original dataset - were uploaded (never shown before to the model) with no single prediction error

Document Liveness Detection

Document Liveness Detection Bad actors present digital images of identification documents instead of “live” IDs in their possession to spoof identity verification processes and commit fraud.

Document liveness detection uses AI and computer vision to distinguish between a present document and a digital image shown on a mobile device or computer display to prevent this type of presentation attack.

Upload your video:



Drag and drop file here

Limit 200MB per file

Browse files



00.cg0001.MOV 14.2MB



Live or Fake Document?

Fake

Thank You 😊

Happy to Answer your Questions