

# Face Recognition: Primates in the Wild

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# Threatened Primates

22%

Mammal Species  
Critically Endangered  
Endangered  
Vulnerable

60%

Primates

91%

Lemurs



# Over Hunting Habitat Loss



# Tracking Primate Individuals

**\$400 to \$4,000**





# Primate Trafficking

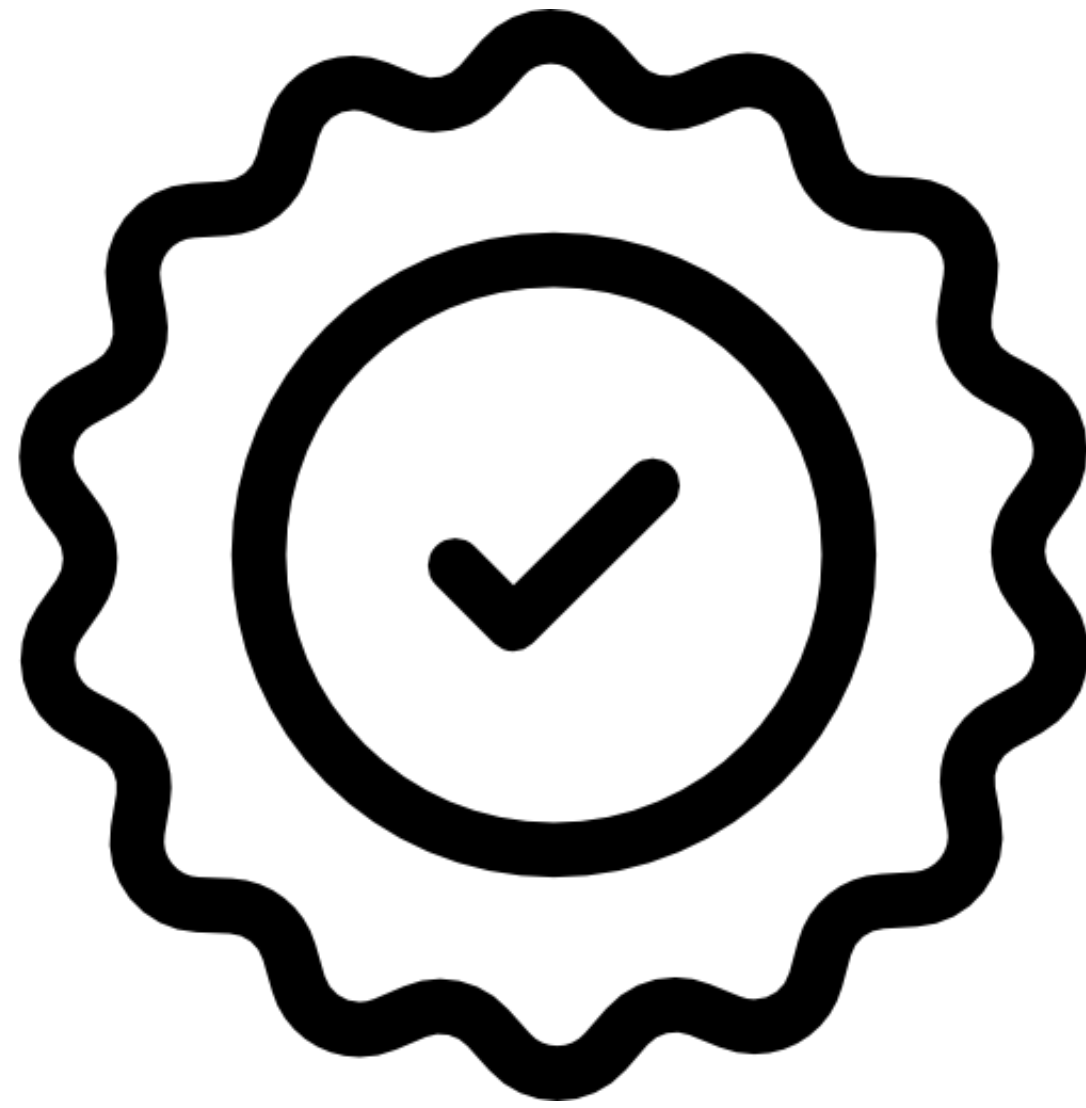
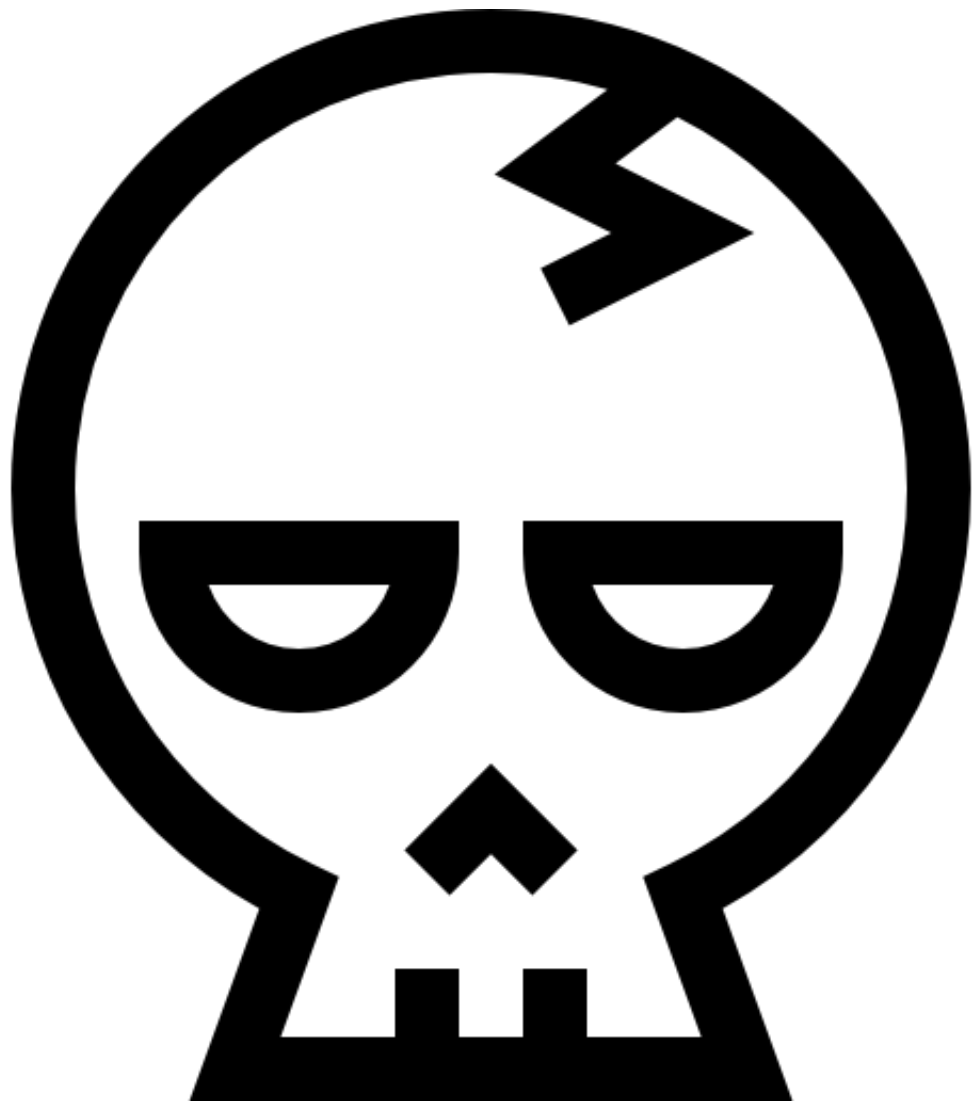
**22,818**

Great Apes Trafficked  
2005 - 2011

**27**

Arrests

# PrimNet



# Dataset

## Lemurs



*Eulemur coronatus*  
Crowned lemur

*Propithecus coquereli*  
Coquerel's sifaka

*Lemur catta*  
Ring-tailed lemur



*Varecia variegata*  
B/W ruffed lemur

*Eulemur collaris*  
Collared brown lemur

*Eulemur mongoz*  
Mongoose lemur

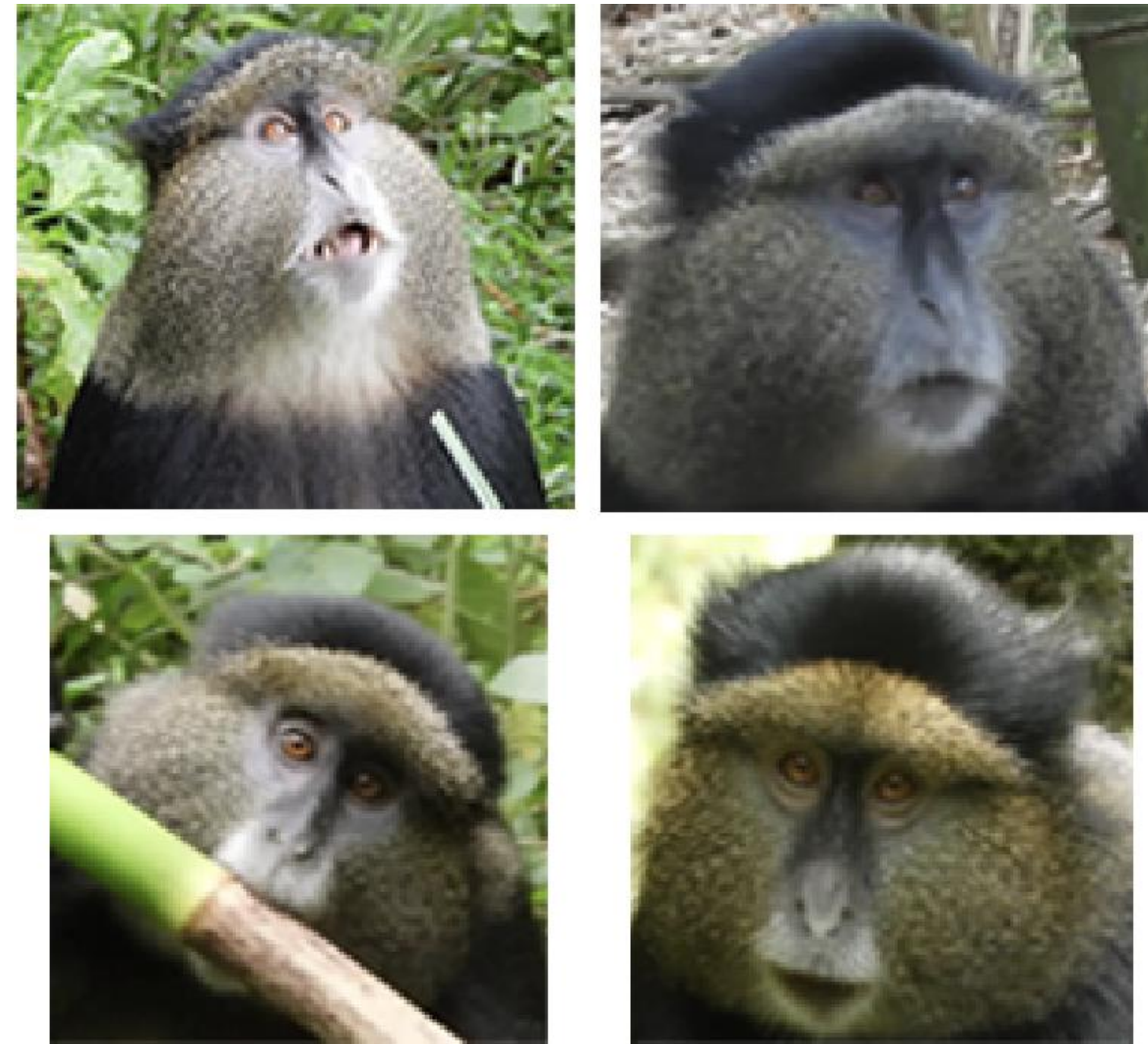


*Varecia rubra*  
Red-ruffed lemur

*Eulemur rubriventer*  
Red-bellied lemur

*Eulemur flavifrons*  
Blue-eyed black lemur

## Golden Monkeys



## Chimpanzees



**3,000** Images

**129** Subjects

**[7, 42]** Images / Subject

**1,450** Images

**49** Subjects

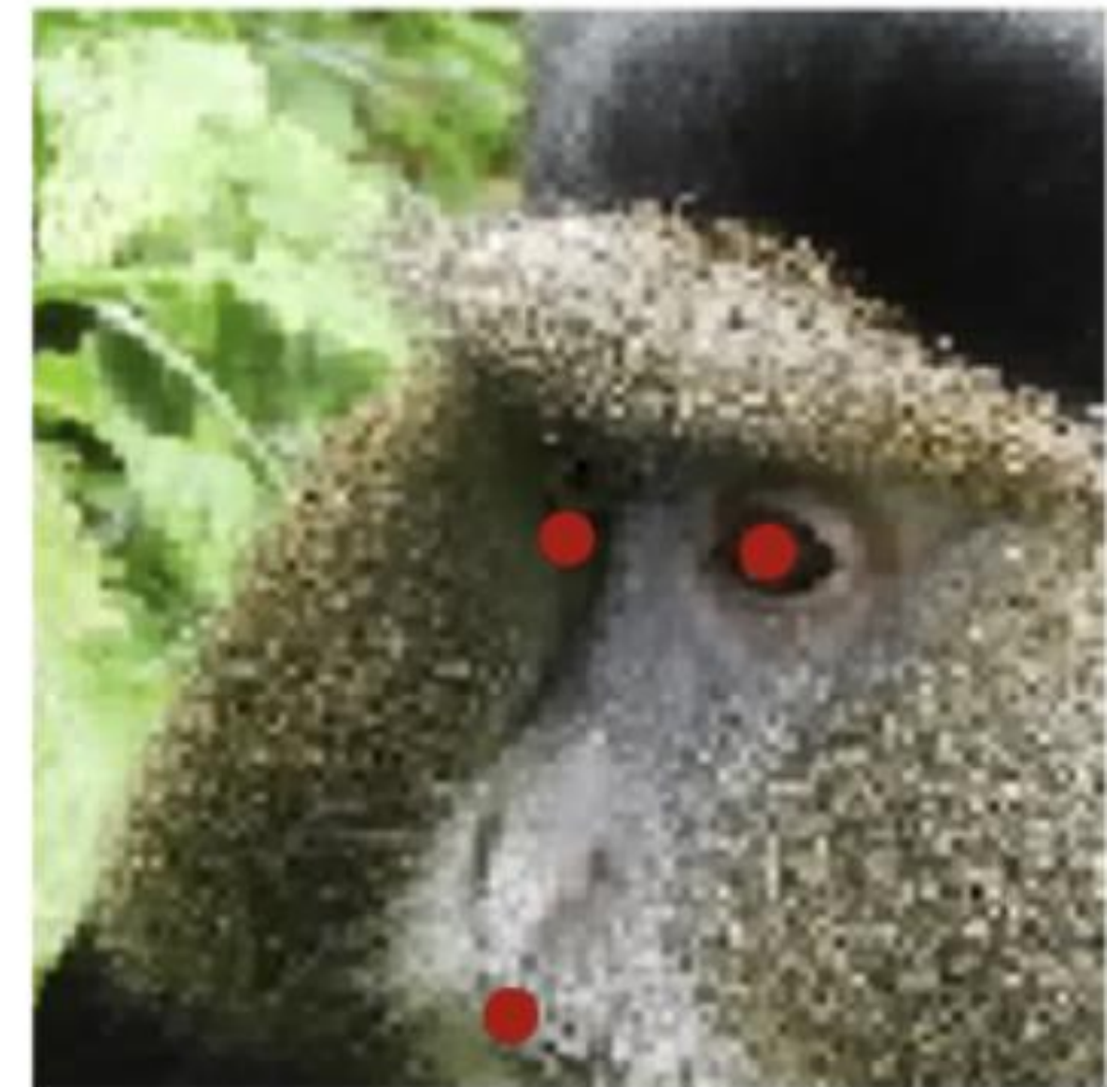
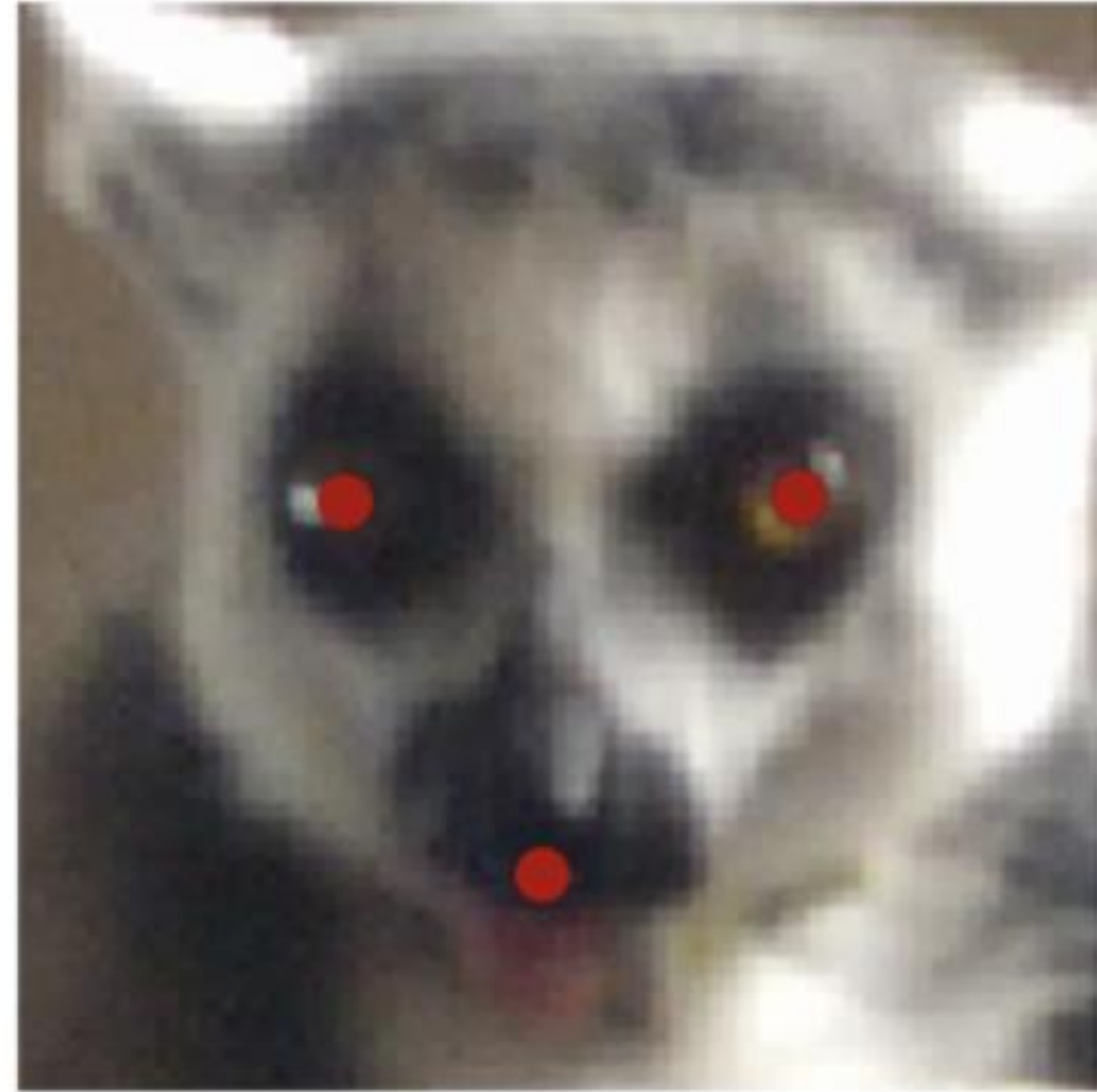
**[2, 120]** Images / Subject

**5,559** Images

**90** Subjects

**[3, 315]** Images / Subject

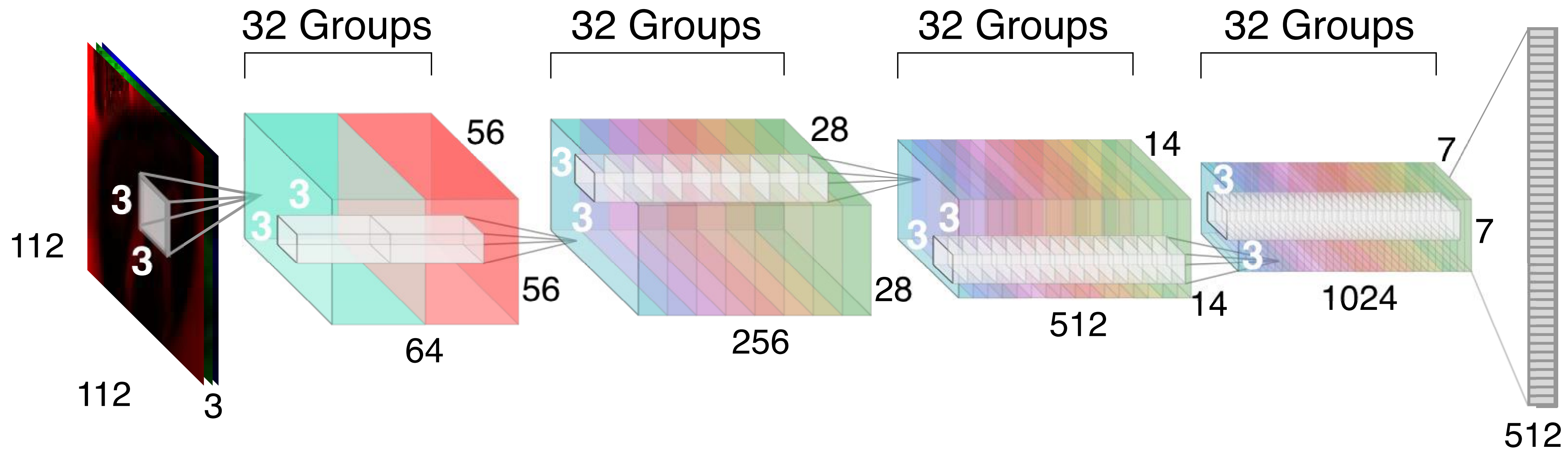
# Alignment



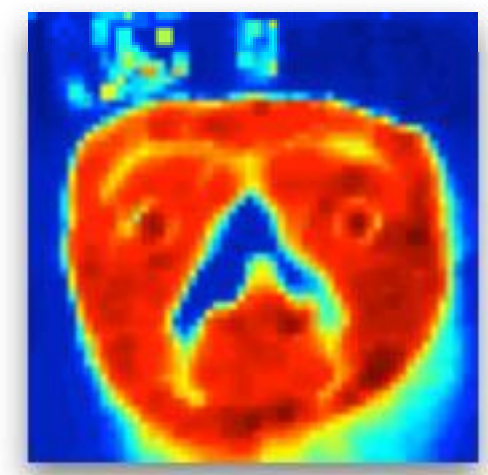
Similarity Transform using 3 manually annotated landmarks (Left Eye, Right Eye, Chin) to align the primate face images



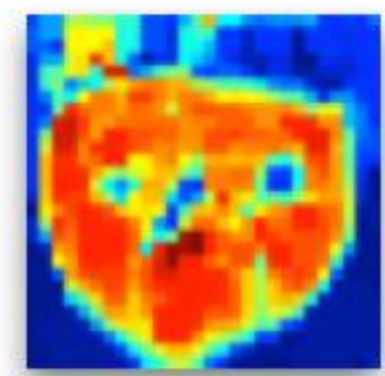
# PrimNet Architecture



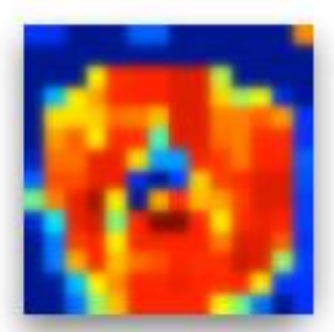
Input



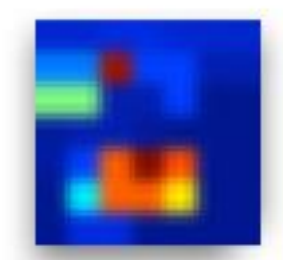
conv1



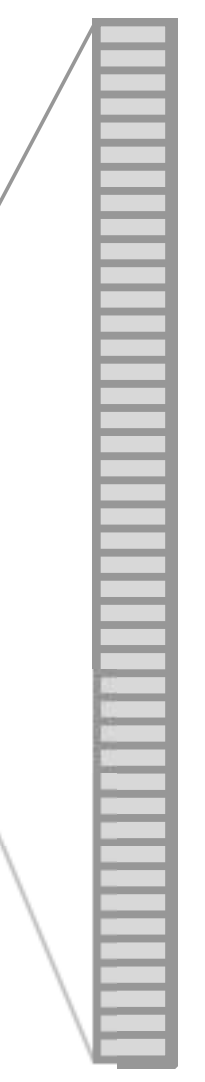
conv2



conv3



conv4



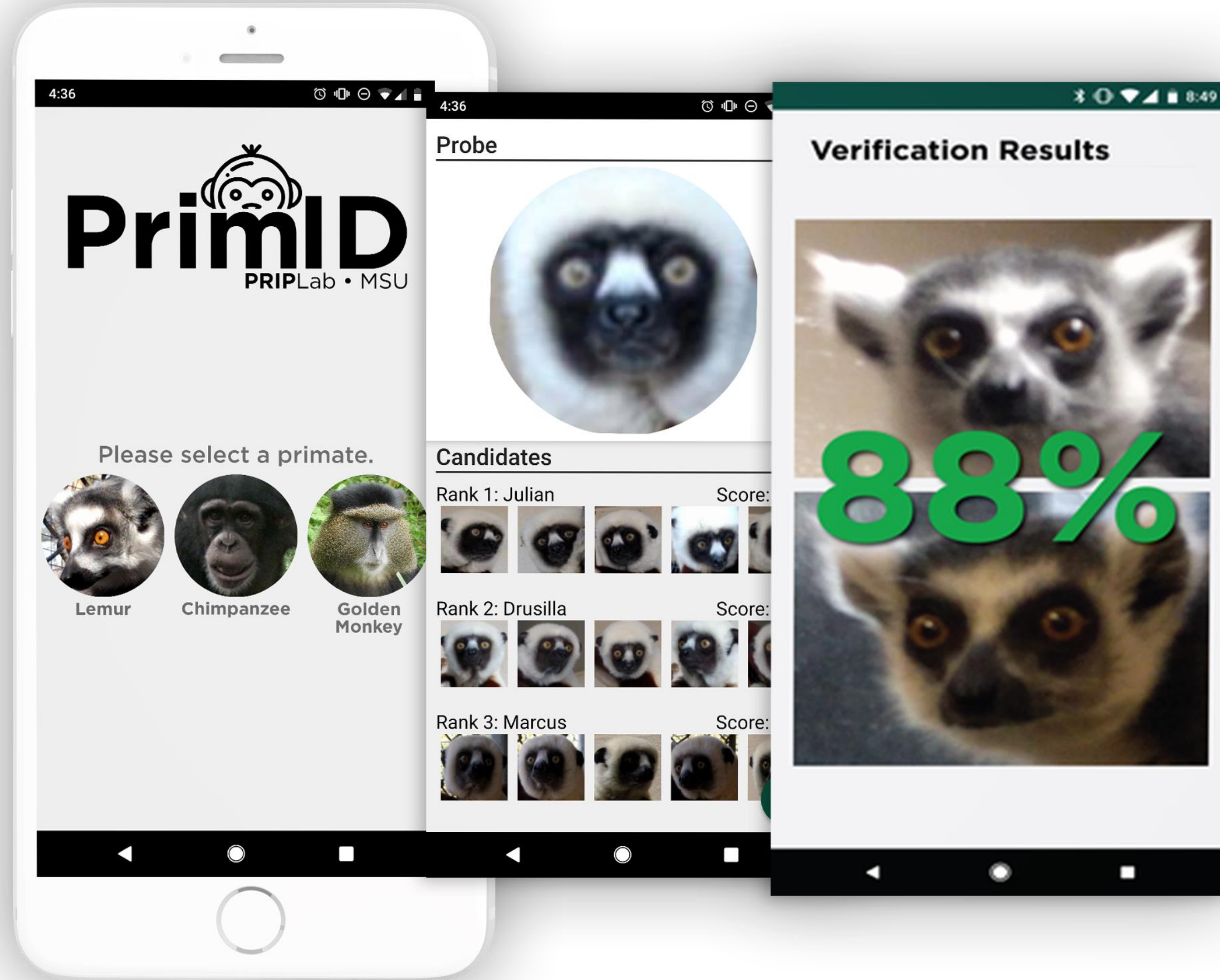
FC

# Experimental Results

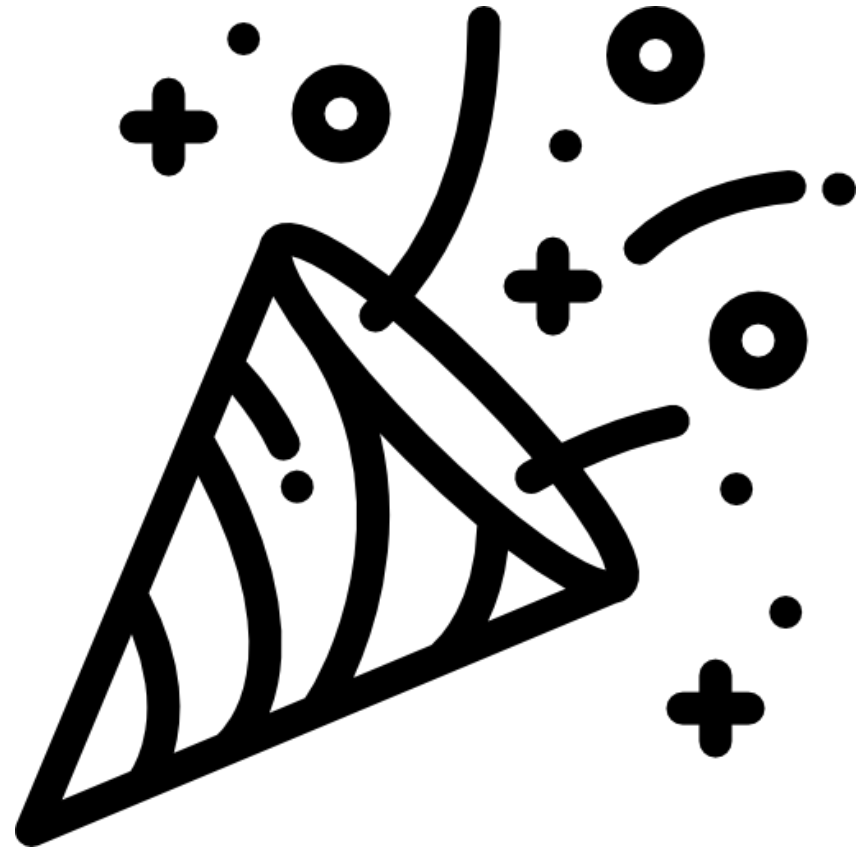
Method	Lemurs			Golden Monkeys			Chimpanzees		
	Verification	Closed-set	Open-set	Verification	Closed-set	Open-set	Verification	Closed-set	Open-set
	1% FAR	Rank-1	Rank-1	1% FAR	Rank-1	Rank-1	1% FAR	Rank-1	Rank-1
Baseline [34]	81.90 ± 3.69	90.82 ± 1.80	N/A	74.88 ± 6.75	89.33 ± 7.68	N/A	44.62 ± 4.38	70.16 ± 3.36	N/A
SphereFace-20 [37]	79.40 ± 5.82	92.45 ± 1.67	80.83 ± 4.48	65.18 ± 12.28	87.32 ± 4.57	61.15 ± 12.80	48.62 ± 6.23	75.49 ± 3.80	30.75 ± 12.41
SphereFace-4 [37]	73.6 ± 5.81	90.18 ± 1.37	72.29 ± 9.49	72.53 ± 6.57	87.49 ± 3.77	69.43 ± 9.27	53.92 ± 2.57	74.19 ± 3.74	35.85 ± 8.22
FaceNet [36]	55.52 ± 7.88	87.06 ± 9.63	56.12 ± 1.93	50.12 ± 15.31	73.47 ± 8.81	49.69 ± 9.54	17.89 ± 7.93	59.75 ± 8.64	4.86 ± 3.38
PrimNet	<b>83.11 ± 5.31</b>	<b>93.76 ± 0.90</b>	<b>81.73 ± 2.36</b>	<b>78.72 ± 5.80</b>	<b>90.36 ± 0.92</b>	<b>66.11 ± 7.99</b>	<b>59.87 ± 3.34</b>	<b>75.82 ± 1.25</b>	<b>37.08 ± 11.22</b>

Method	Inference Speed (ms / img)	Model Size (MB)
SphereFace-20 [37]	17.26	87
SphereFace-4 [37]	<b>13.05</b>	48
FaceNet [36]	40.42	90
<b>PrimNet</b>	23.58	<b>3.9</b>

# PrimID: Mobile App

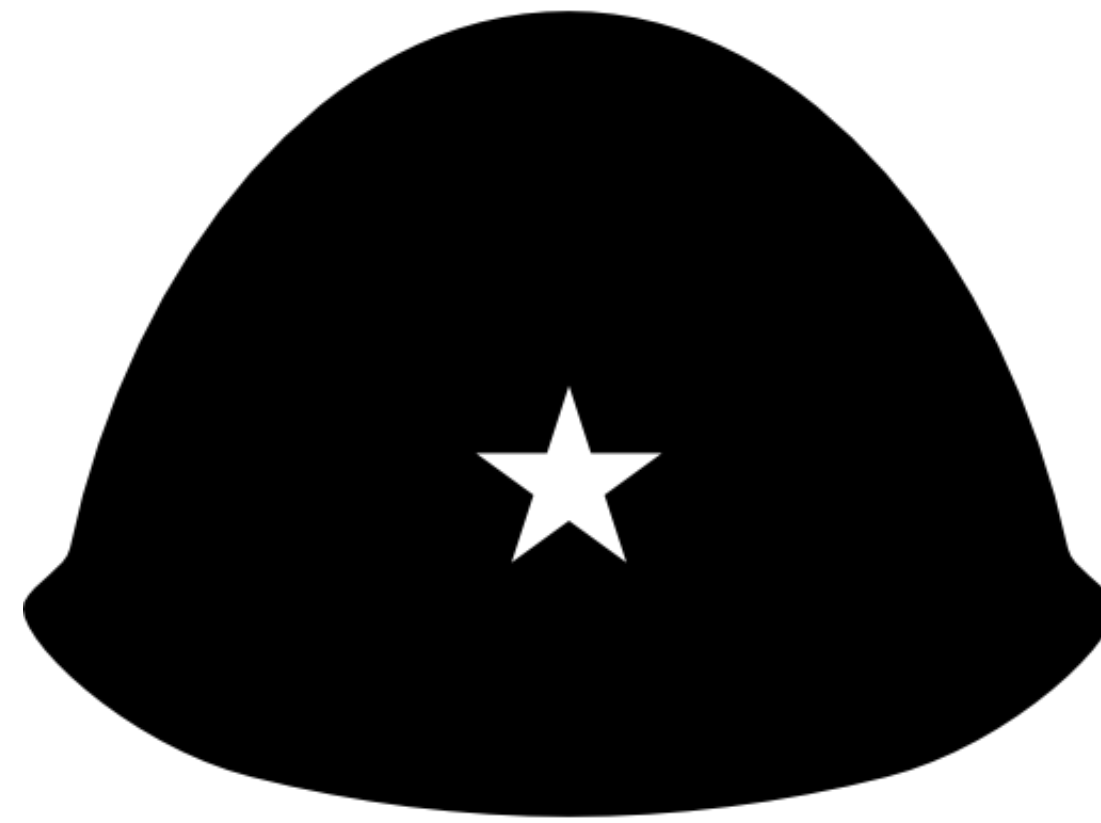


# Conclusion



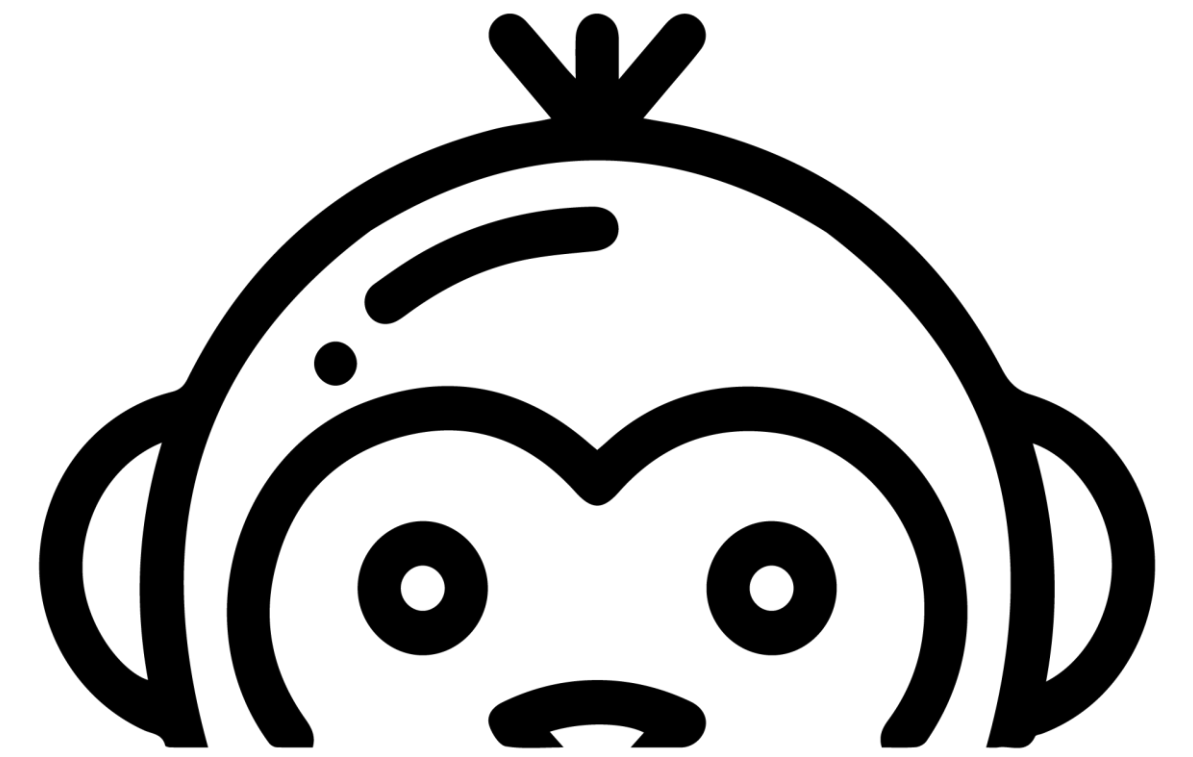
**93.75%**

Identification Accuracy  
(Lemurs)



**Generalizable**

Golden Monkeys,  
Chimpanzees ...



**PrimID**

Mobile App