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

Great Apes Trafficked
2005 - 2011

22,818
27

Rentests
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
- *Macaca fascicularis* - Black-handed gibbon
- *Macaca silenus* - Zanzibar red colobus
- *Cercopithecus mona* - Mona monkey

#### Chimpanzees
- *Pan troglodytes* - Chimpanzee

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**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

<table>
<thead>
<tr>
<th>Method</th>
<th>Lemurs</th>
<th>Golden Monkeys</th>
<th>Chimpanzees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verification</td>
<td>Closed-set</td>
<td>Open-set</td>
</tr>
<tr>
<td></td>
<td>1% FAR</td>
<td>Rank-1</td>
<td>Rank-1</td>
</tr>
<tr>
<td>Baseline [34]</td>
<td>81.90 ± 3.69</td>
<td>90.82 ± 1.80</td>
<td>N/A</td>
</tr>
<tr>
<td>SphereFace-20 [37]</td>
<td>79.40 ± 5.82</td>
<td>92.45 ± 1.67</td>
<td>80.83 ± 4.48</td>
</tr>
<tr>
<td>SphereFace-4 [37]</td>
<td>73.6 ± 5.81</td>
<td>90.18 ± 1.37</td>
<td>72.29 ± 9.49</td>
</tr>
<tr>
<td>FaceNet [36]</td>
<td>55.52 ± 7.88</td>
<td>87.06 ± 9.63</td>
<td>56.12 ± 1.93</td>
</tr>
<tr>
<td>PrimNet</td>
<td>83.11 ± 5.31</td>
<td>93.76 ± 0.90</td>
<td>81.73 ± 2.36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Inference Speed (ms / img)</th>
<th>Model Size (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SphereFace-20 [37]</td>
<td>17.26</td>
<td>87</td>
</tr>
<tr>
<td>SphereFace-4 [37]</td>
<td><strong>13.05</strong></td>
<td>48</td>
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<tr>
<td>FaceNet [36]</td>
<td>40.42</td>
<td>90</td>
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<tr>
<td>PrimNet</td>
<td>23.58</td>
<td><strong>3.9</strong></td>
</tr>
</tbody>
</table>
PrimID: Mobile App
Conclusion

93.75% Identification Accuracy (Lemurs)

Generalizable
Golden Monkeys, Chimpanzees ...

PrimID
Mobile App