FaceKeeper
Privacy-Aware Distributed Computation of Family Photo Collections

Research Objectives
Designing a novel system for family photo collection analysis by:

- leveraging local home networking
- reducing dependence on cloud services
- prioritizing privacy
- maximizing sustainability through device reuse (Internet of Things)

Background
Family photos are personal, private information. There is a need for alternative storage models for secure, private (offline) media archiving & curation.

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50 Billion Family Photos uploaded to Google Photos

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Results
Accuracy: 89.7%
Speed: 6.4 MB/Second
Active Cores: 16
Core Clock Speed: 1 GHz

Outcomes & Deliverables
A robust face clustering algorithm written in Python, with documentation available for open source use on GitHub. Reverse Image Search on Photo Collection feature was built complementing the research. The delivered software supports device re-use by supporting single-board computers such as Raspberry Pi.

Future Work
Integration to build a number of photo curation and personal reflection applications. Integrating Relationship Network for analyzing and predicting connections between different individuals.

Demographics
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- 50 Billion Family Photos uploaded to Google Photos

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Research Challenge:
- Processing-intensive computations (such as photo analysis) are usually performed on a single powerful machine, or a network of processors hosted as a cloud service.
- A single, dedicated powerful machine is expensive and not sustainable.
- Lots of “smart” home electronics have small embedded processors that could be networked to do processing-intensive tasks.

Tools Used:
- Celery - Distributed Task Queue
- RabbitMQ - Message Broker
- Python - Programming Language
- MongoDB - Database Systems
- OpenFace - Facial Recognition Library

Hardware Used:
- Raspberry Pi - Distributed Computing
- Cisco SG110D - Network Switch

The project was trained on a self-curated Family Photo Collection dataset.
Handling Visually Challenging Cases:
- Age Difference
- Snapchat/Instagram Filters
- Different Face Angles/Occlusion

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Demo
https://z.umn.edu/findme

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FaceKeeper Driven to Discover