



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



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Facerecognition for social communities and online image databases

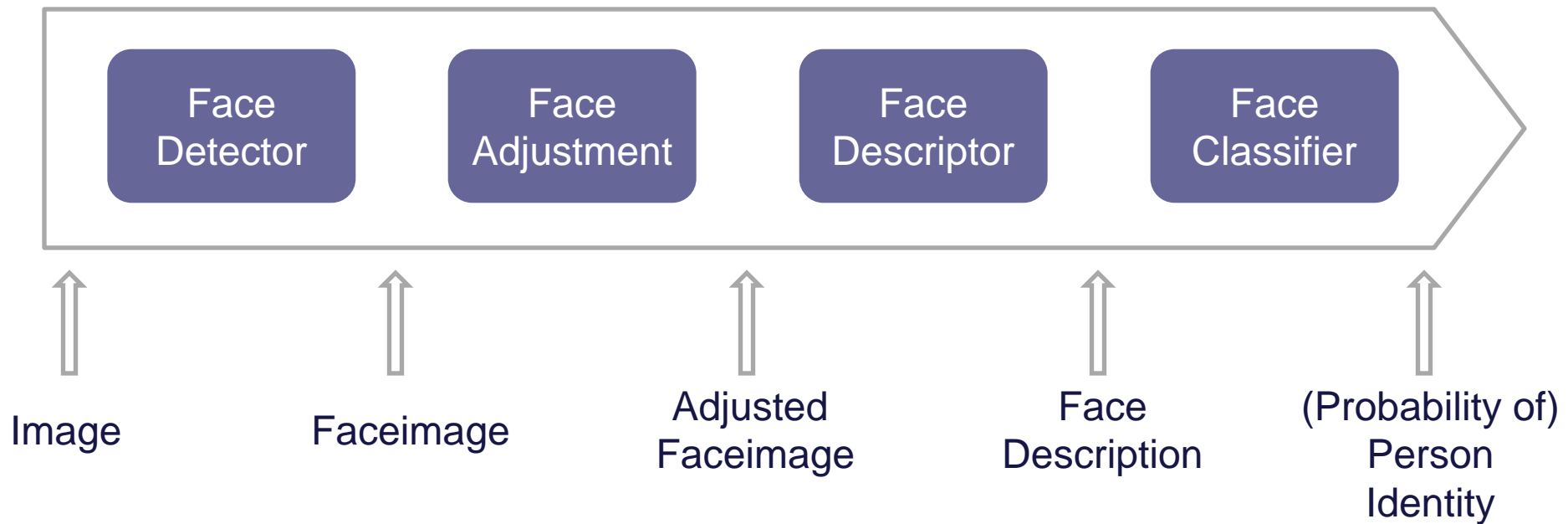
Diplomarbeit
Zwischenvortrag
22. Februar 2010
Dantone Matthias

Agenda

- 1 Facerecognition Pipeline
- 2 Facerecognition Pipeline Extension (social context)
- 3 Outlook
- 4 Sources

1. Facerecognition Pipeline

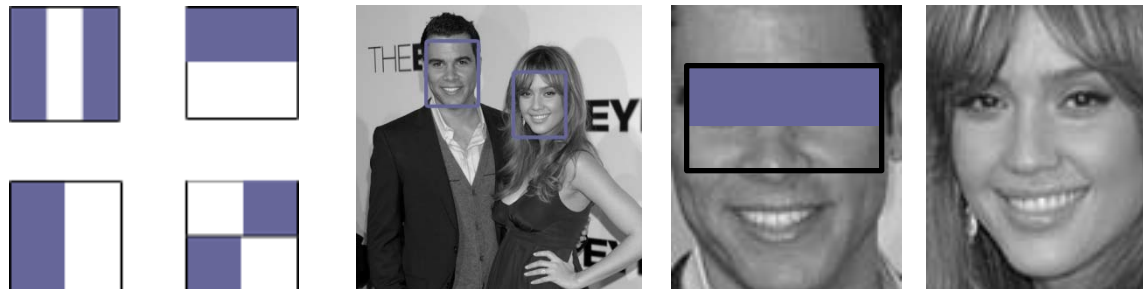
Facerecognition Pipeline





Facedetector

- Viola and Jones [1]
 - Simpel features
 - Integral Image
 - Ada-Boosting:
Combination of weak classifier to a strong classifier
 - openCV implementation



fotos: [6]



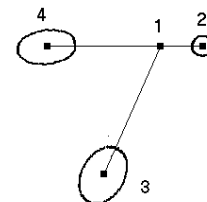
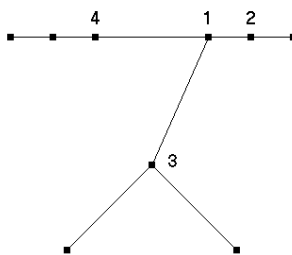
Face Adjustmend – Pose

- Facial Features Detection
 - AdaBoosting and SVM
 - Pictorial Structures [2]

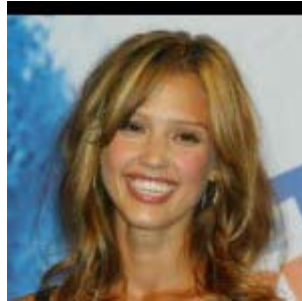
$$L^* = \arg \min_L \left(\sum_{i=1}^n m_i(l_i) + \sum_{(v_i, v_j) \in E} d_{ij}(l_i, l_j) \right)$$



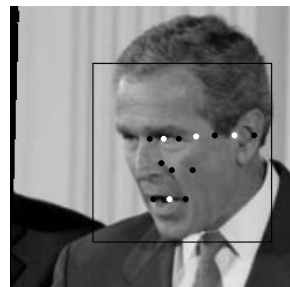
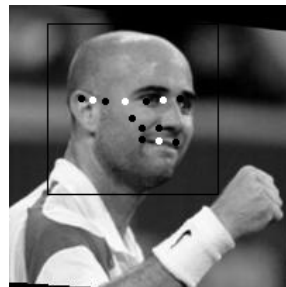
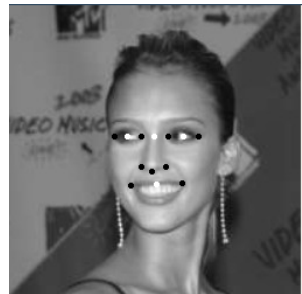
foto: [6]



Pose Adjustmend examples



Facial Features Detection examples

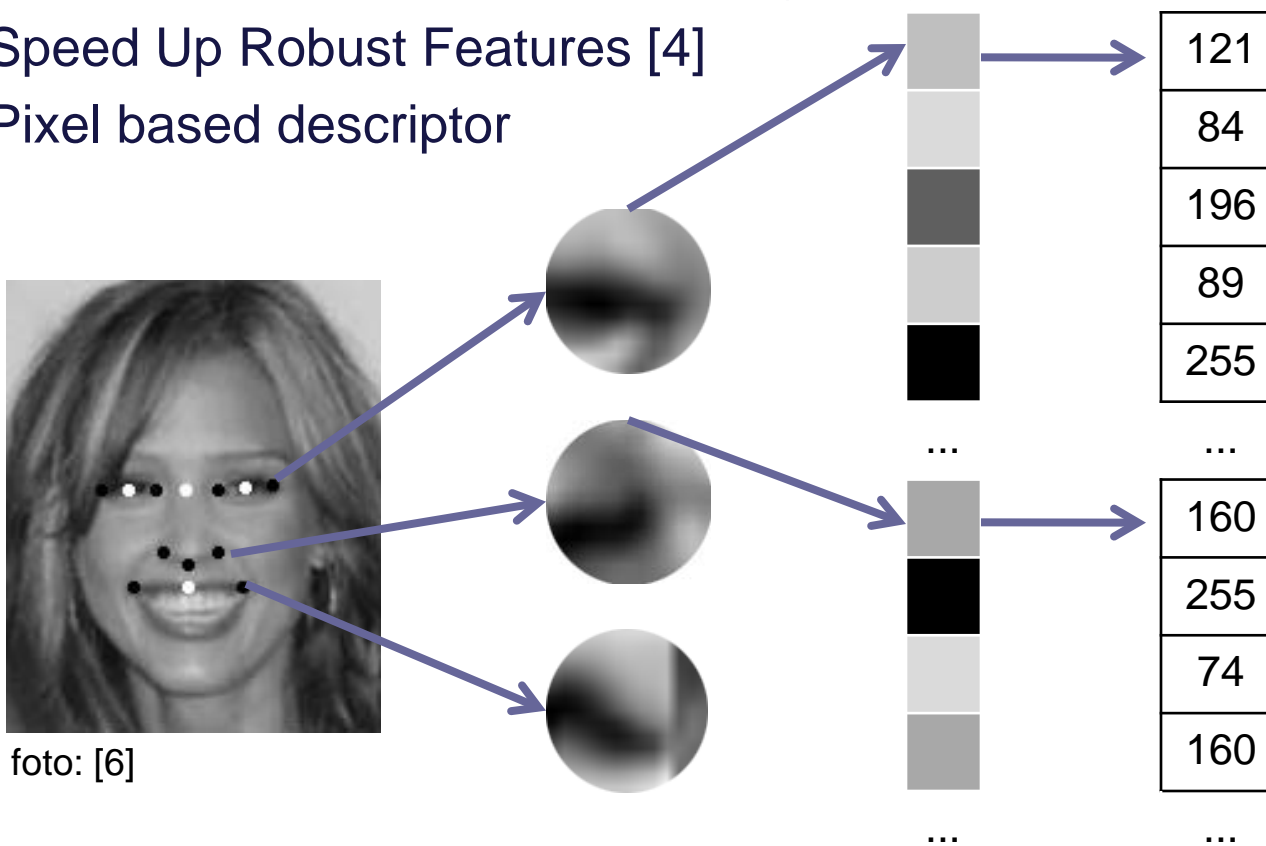


all fotos: [6]



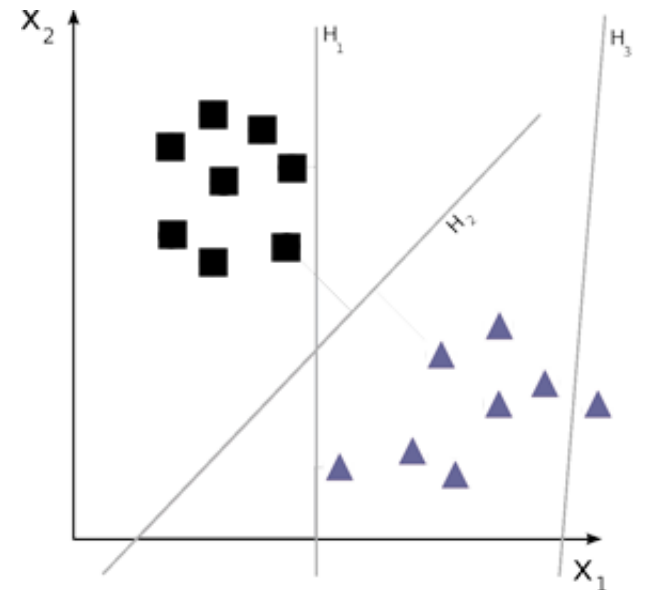
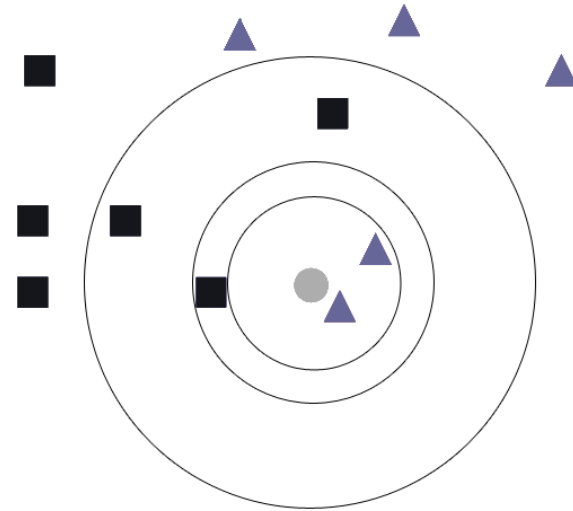
Face Descriptor

- Descriptor for every facial feature
 - Scale-invariant feature transform (SIFT) [3]
 - Speed Up Robust Features [4]
 - Pixel based descriptor



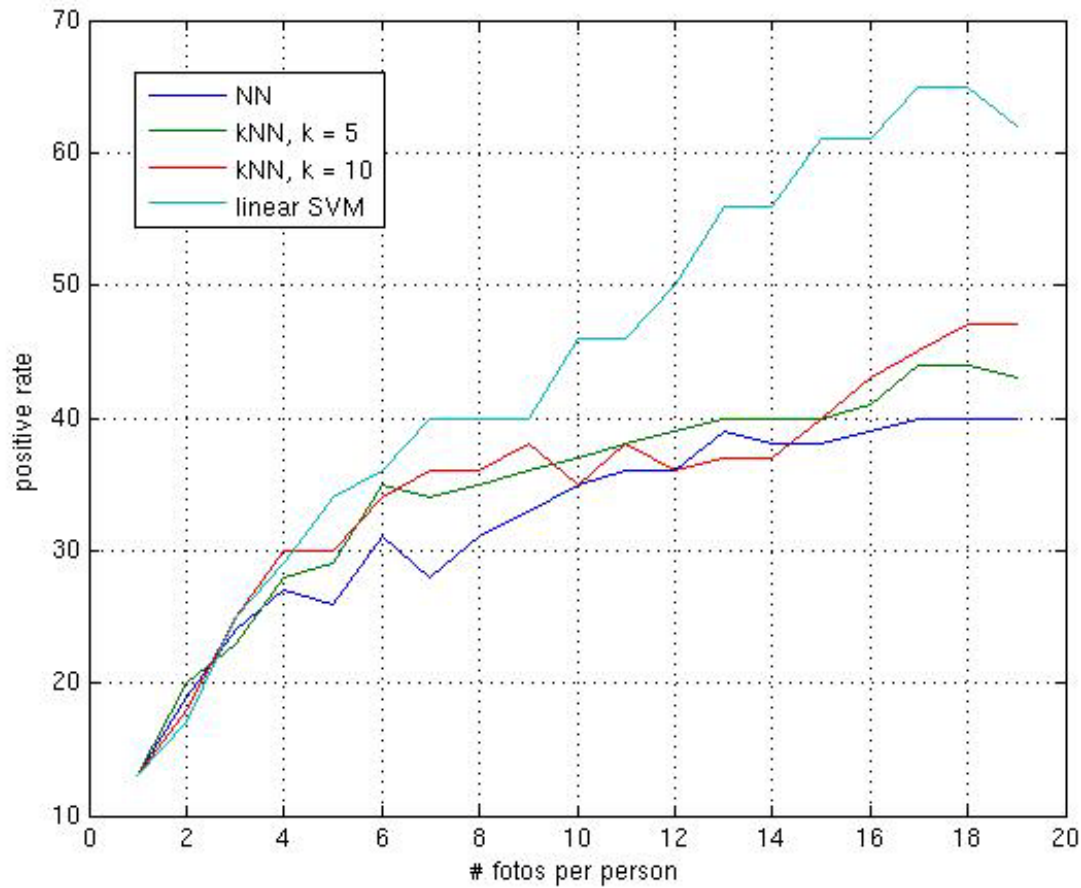
Classifier

- k-Nearest Neighbor
 - Euclidean Distance
 - Cosine Distance
- Support Vector Machine [5]
 - Linear Kernel
 - Too many features for a non linear kernel



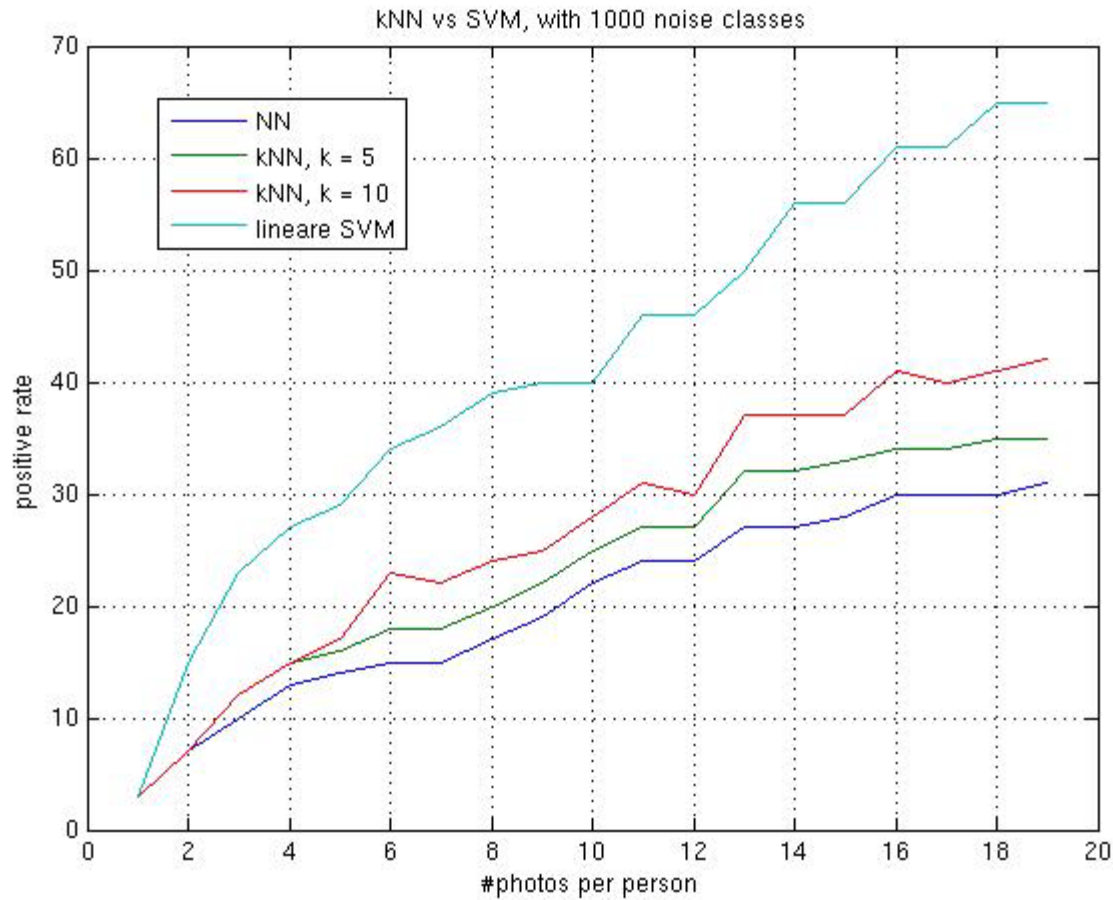


Results with different classifiers



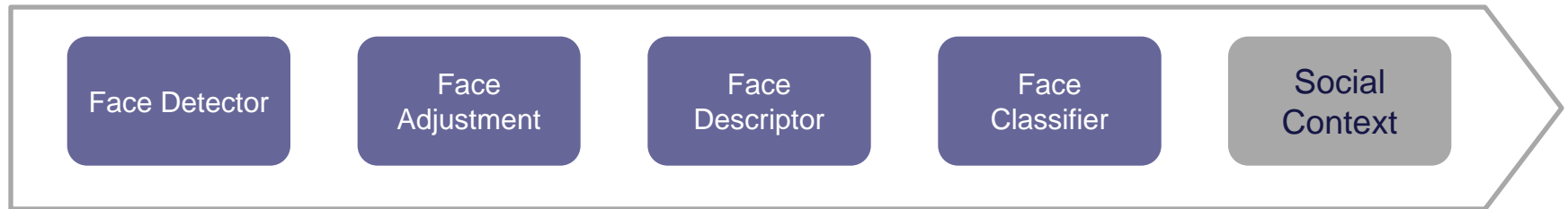


Results with different classifiers



2. Facerecognition Pipeline Extension

Facerecognition Pipeline Extension



- Without social network context:
 - $\text{FaceScore}(\text{FaceImg})$
- With social network context:
 - $\text{FaceScore}(\text{FaceImg} | c)$
 - $c = \{ \text{Set of friends, identity of fotographer, friends of fotographer, ... } \}$

Lessy Manica

- fully automatic facebook user written in python
- random first friend (South Africa)
- 10 friend requests every day

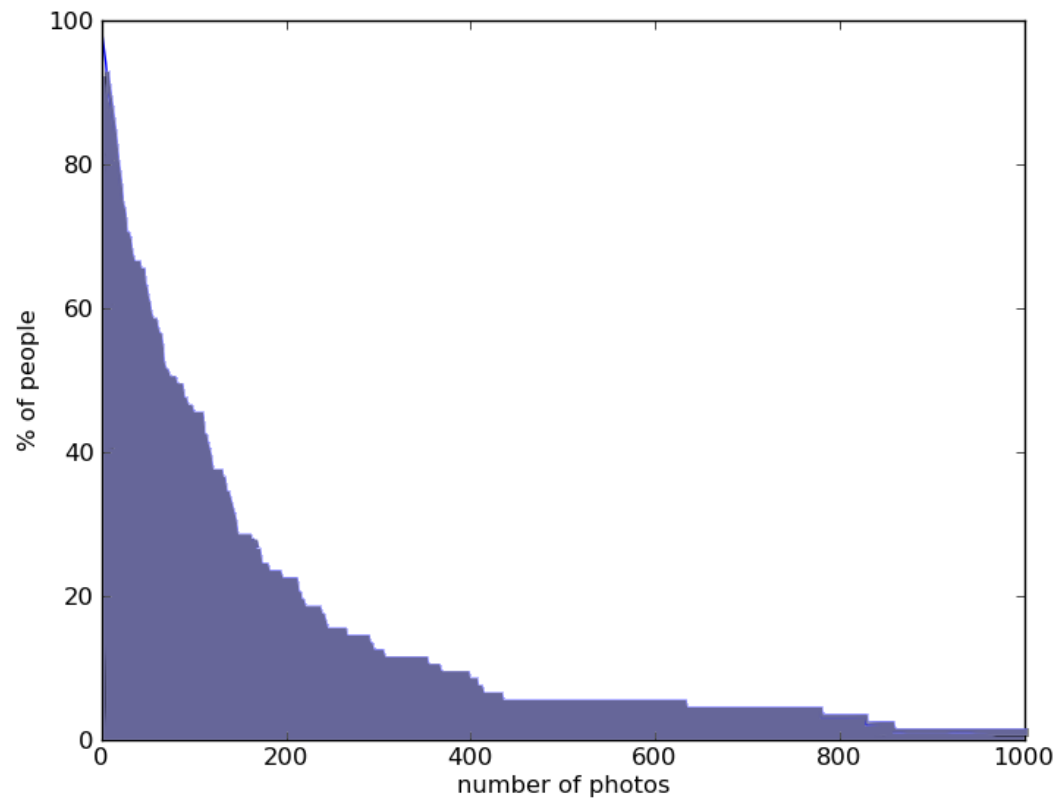
- **Statistics:**
 - Friends: 220
 - Fotos from friends of friends: 1,008,316
 - Tags: 2,705,860
 - Users: 30,077
 - Albums: 1,373



The image shows a screenshot of a Facebook profile for a user named 'Lessy Manica'. The profile header includes the name 'Lessy Manica' and tabs for 'Wall' and 'Info'. Below the header is a large profile picture of a person holding a camera. A 'Send Lessy a Message' link is visible below the picture. The 'Friends' section shows '220 friends' and a 'See All' link. Below this, there are six small profile pictures of friends with their names: Corneil Kriel, Riaan Strydom, Quintin Prinsloo, Carla van Heerden, Heinrich Strydom, and Laurette SweetLou VdWalt. On the right side of the profile, there is a 'RECENT ACTIVITY' section listing various interactions with other users, such as 'Lessy and Bianca V', 'Lessy and Wickus C', 'Lessy and Johan C', 'Lessy and Peter Sp', 'Lessy and Clarissa I', 'Lessy and Zack Gol', 'Lessy and Monica J', 'Lessy and Simonè F', 'Lessy and Jaco Bui', 'Lessy and Philip van', 'Lessy and Gc Mock', 'Lessy and Deon He', 'Lessy and Su-mari I', 'Lessy and Jason W', 'Lessy and Caitlyn F', 'Lessy and Aliza Gre', 'Lessy and Dale Dut', 'Lessy and Riaan St', 'Lessy and Tiaan Va', 'Lessy and Sammy L', 'Lessy and Le-jaine', 'Lessy and Francis C', and 'Lessy and Sune Kili'.

Statistics

	MIN	MAX	MEAN
# Friends	46	1035	46
# Real Friends	0	338	70
# Fotos/Friends	0	1339	145



Probabilities

- $P(\text{persons in a foto are friend}) = 0.61$
- $P(\text{persons are friend with fotograf}) = 0.77$

Example:

- $\text{FaceScore}(?) = \begin{matrix} 0.61 & \text{Person X and} \\ 0.34 & \text{Person Y} \end{matrix}$
- $\text{Person X} = \text{NOT friend_of_A and NOT friend_of_Fotograf}$
 $P(X | c) = 0.61 * 0.39 * 0,23 = 0,03$
- $\text{Person Y} = \text{friend of A and friend_of_Fotograf}$
 $P(Y | c) = 0.34 * 0.61 * 0.77 = 0,145$

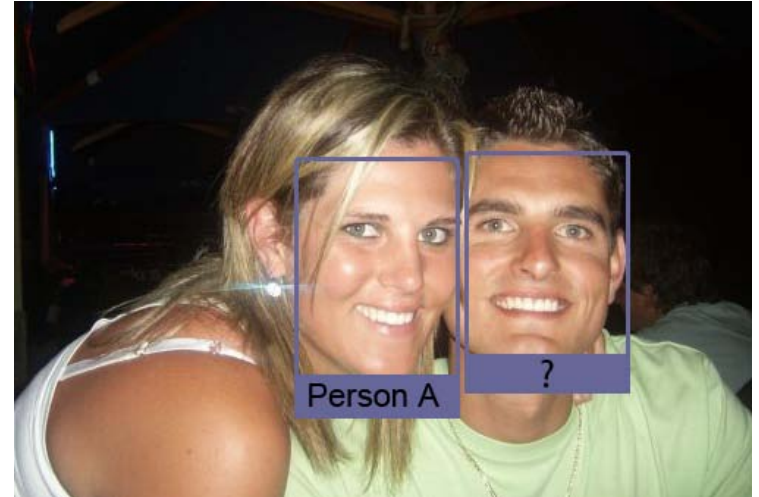


foto: [6]

Outlook.

**Thank you for your attention.
Any questions?**

- 1: Viola, P. and Jones, M. : Proc. IEEE CVPR : Rapid Object Detection using a Boosted Cascade of Simple, (2001).
- 2: Felzenszwalb, P.F. and Huttenlocher, D.P. : International Journal of Computer Vision : Pictorial structures for object recognition (2005)
- 3: Lowe, D.G. : Object recognition from local scale-invariant features (1999).
- 4: Bay, H. and Tuytelaars, T. and Van Gool, L. : Springer: Surf: Speeded up robust features (2006)
- 5: Hearst, M.A.: Support Vector Machines (1998)
- 6: Huang, G.B. and Ramesh, M. and Berg, T. and Learned-Miller, E. : Labeled Faces in the Wild: A Database for Studying Face Recognition in Unconstrained Environments (2002)