Deep Watching

Towards New Methods of Analyzing Visual Media in Cultural Studies

bernhard.bermeitinger@unisg.ch · @bermeitinger_b
gernot.howanitz@uni-passau.de · @ghowa

DH2019, Utrecht · 11 July 2019

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

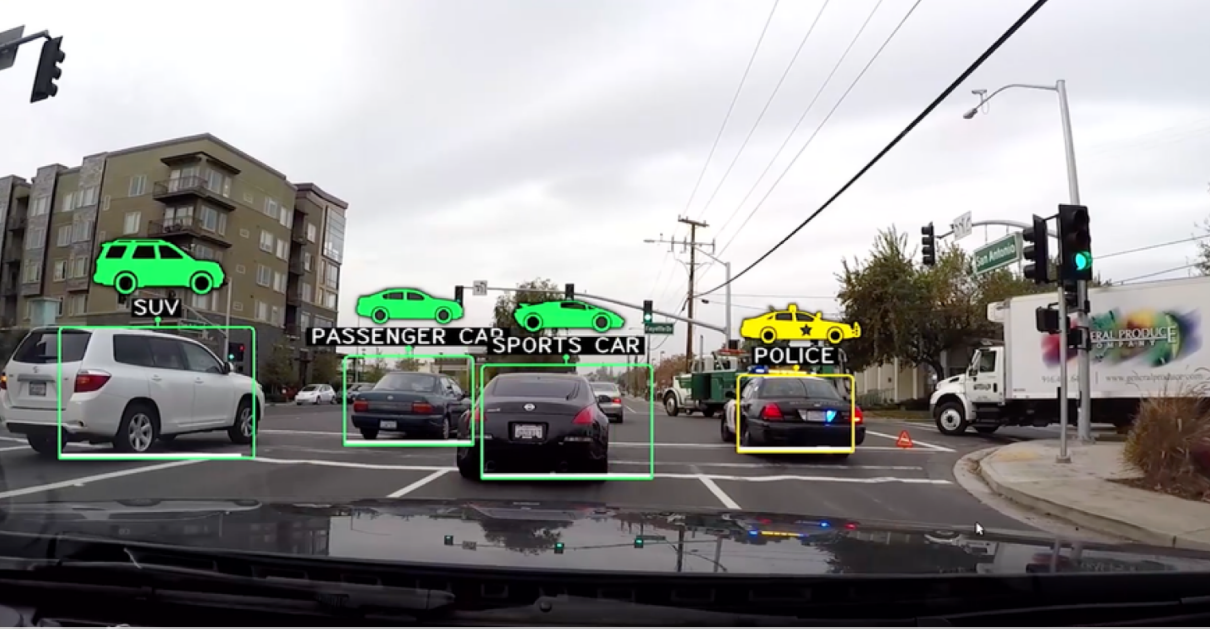
UNIVERSITÄT PASSAU

1. Deep Watching

2. Bodies as/and Signs

3. Symbolic Contexts

Deep Watching



https://fortunedotcom.files.wordpress.com/2015/10/screen-shot-2015-10-15-at-8-04-48-pm.png (July 11, 2019)


SenseFace
人脸布控实战平台
SenseFace Face Recognition Surveillance Platform
SENSEFACE
2018年4月17日 周二 14:47:14
布控数
1,206
入库数
23,059
5,463
307
告警数
2,278
300
36
时间：2017/07/03 16:20:22:12
地点：和平饭店

Bodies as/and Signs

Corpus & Methods

270 cigarette cards from the album “Bunte Filmbilder” (test corpus)

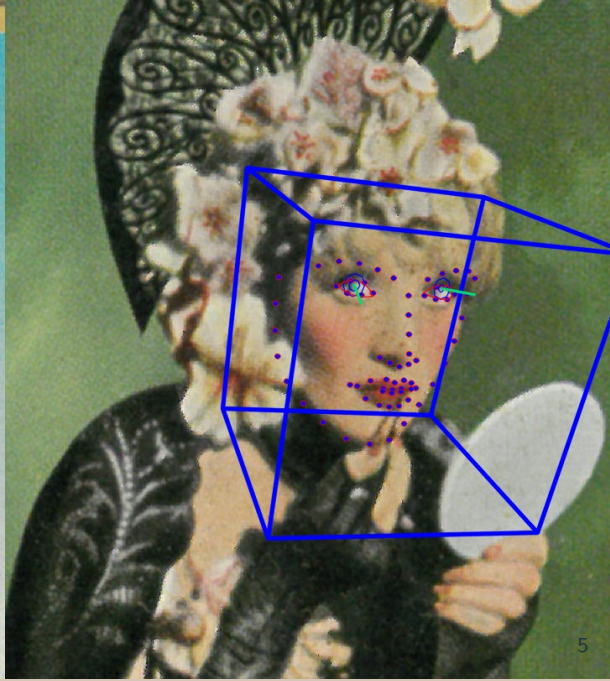
17,669 cigarette cards (`https://www.virtual-history.com/movie/moviecard`)

700 movie cards, digitized in cooperation with Filmmuseum Potsdam

Facenet (Sandberg 2018) for face recognition

Detectron (Girshik et al. 2018) and *RMPPE* (Cao et al. 2017) for pose estimation

OpenFace (Baltrušaitis et al. 2018) for facial behaviour analysis



HOTSPOTS


Cluster 1

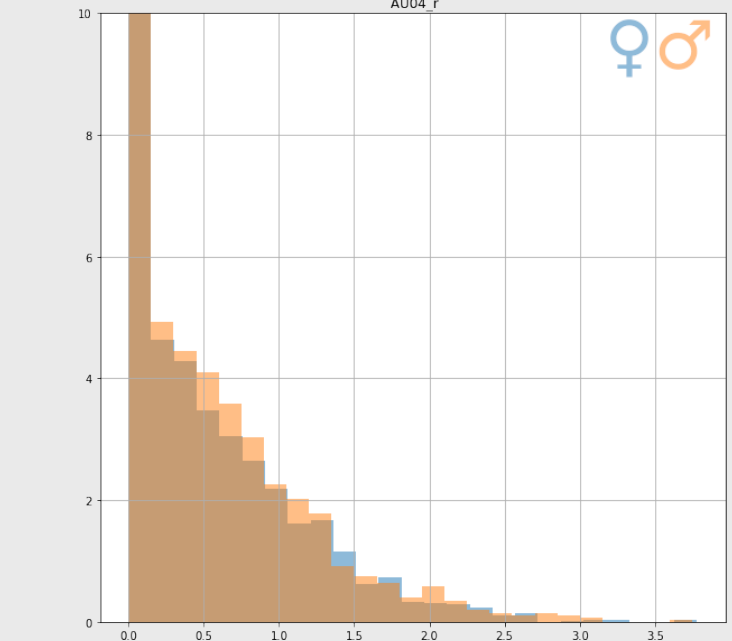

Cluster 2


Cluster 3

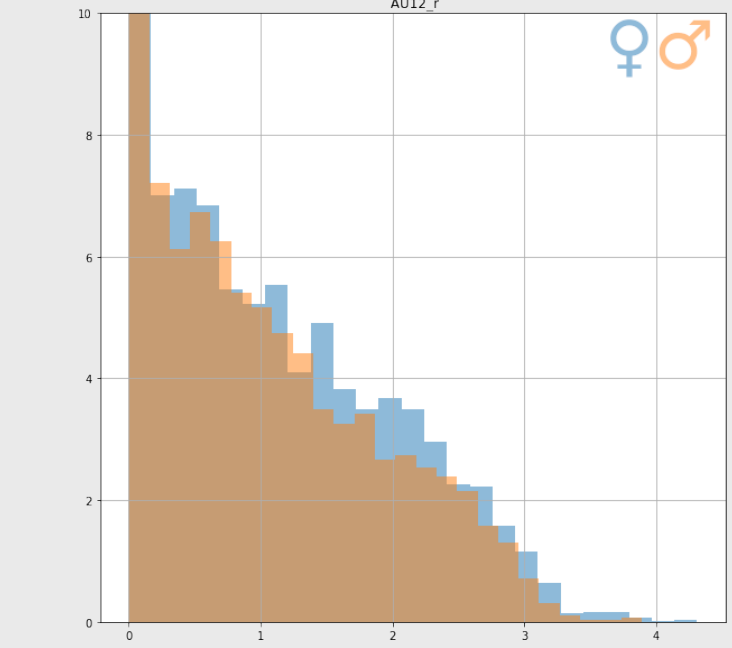

Cluster 4

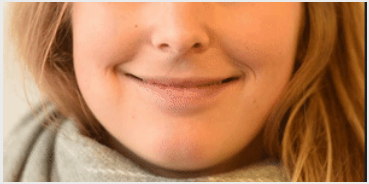

Cluster 5


Cluster 6



https://imotions.com/wp-content/uploads/2016/12/AU4-brow-lowerer.gif (July 11, 2019)





https://imotions.com/wp-content/uploads/2016/12/AU12.gif
(July 11, 2019)

Symbolic Contexts

Corpus & Methods

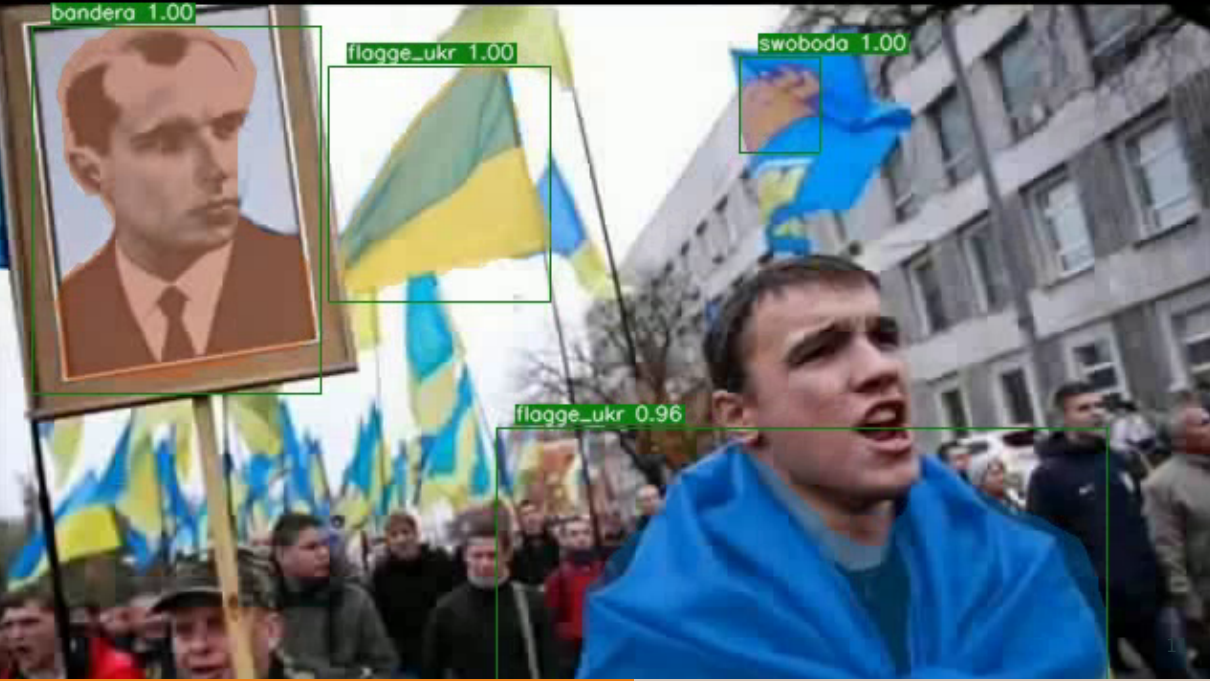
400 YouTube videos about Ukrainian nationalist Stepan Bandera (1909-1959)

Facebook's *Detectron* framework

MaskRCNN (He, Gkioxari et al. 2017) as *Regions-of-Interest* localisator

ResNet101 (He, Zhang et al. 2015) for feature extraction

Ukrainian nationalist symbols	*German fascist symbols*	*Polish nationalist symbols*	*Russian / Soviet nationalist symbols*
Ukrainian coat of arms (208) 	SS-Rune (106) 	Polish coat of arms (38) 	Hammer & Sickle (111) 
Logo of Swoboda (129) 	Swastika (187) 	Falanga (91) 	Ribbon of St. George (147) 
Ukrainian flag (198) 	Wolfsangel (96) 		
Flag of UPA (212) 			
OUN Symbol (57) 			


bandera 1.00
flagge_ukr 1.00
swoboda 1.00
flagge_ukr 0.96

Training Results

$mAP_{IoU=0.5} = 0.72$

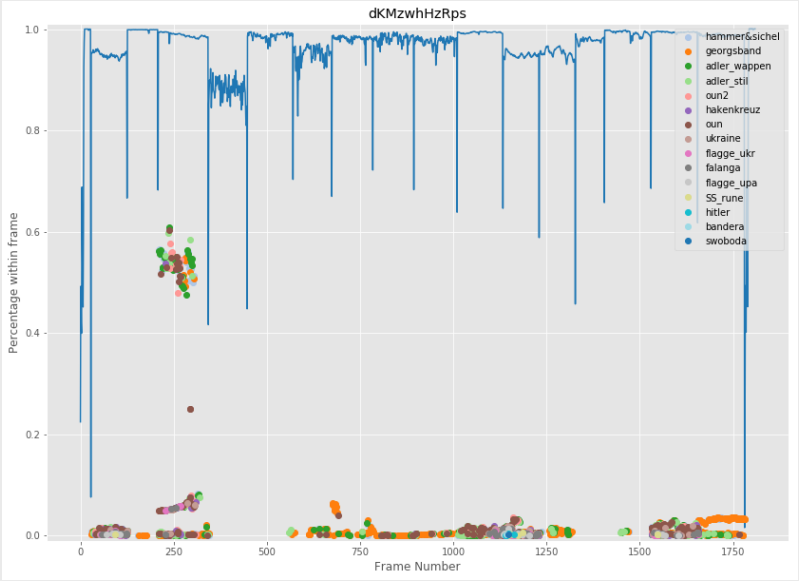
If proposed region and gold annotation match at least 50%, this region is correctly classified in 72% of the cases

$IoU = \frac{\text{Intersection}}{\text{Union}}, \mathcal{W} = [0, 1]$
Measure for congruence of proposed region with gold annotation

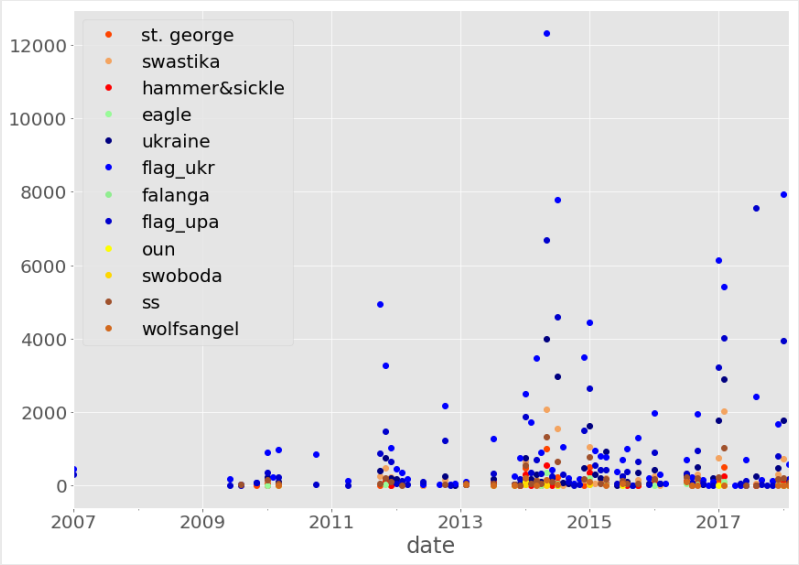
mean **A**verage **P**recision
Relation of correctly classified regions to all classifications

Typically $mAP_{IoU=0.5}$ or $mAP_{IoU=0.75}$ is used

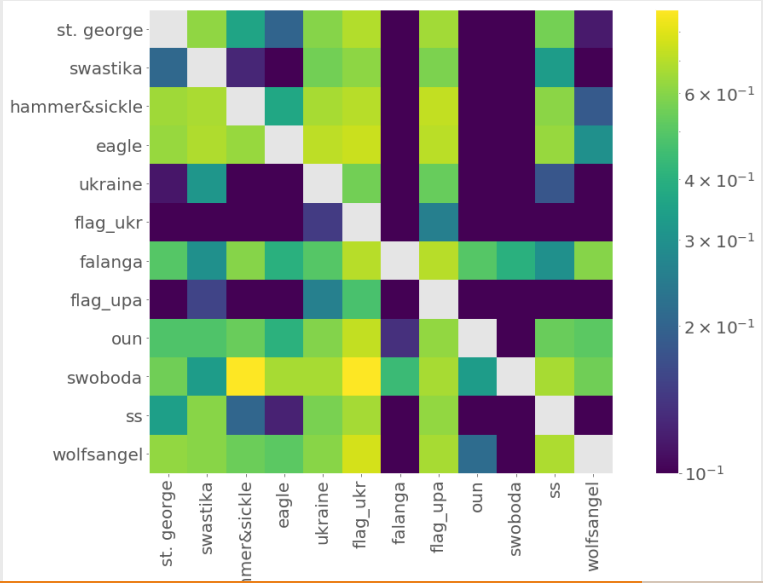
Symbols per Video



Symbols over Time



Coocurrences (Adjusted for Symbol Frequency)



RCNN as a possibility to automatically extract complex symbolical information from visual media

Plethora of pre-trained models available, but applicability in the field of Cultural Studies may vary

Thus, training ‘special interest’ and/or ‘niche’ models becomes more and more important

Literature

Amos et al. 2016. "Openface: A general-purpose face recognition library with mobile applications", CMU-CS-16-118, Tech. Rep. https://www.cs.cmu.edu/~satya/docdir/CMU-CS-16-118.pdf [Zugriff 29. 9. 2018].

Baltrušaitis et al. 2018. "OpenFace 2.0: Facial Behavior Analysis Toolkit", IEEE International Conference on Automatic Face and Gesture Recognition 2018, https://ieeexplore.ieee.org/document/8373812 [Zugriff 29. 9. 2018].

Cao et al. 2017. "Realtime Multi-Person 2D Pose Estimation using Part Affinity Fields". CVPR 2017. https://arxiv.org/pdf/1611.08050.pdf [Zugriff 29. 9. 2018].

Girshick et al. 2018. "Detectron". https://github.com/facebookresearch/detectron [Zugriff 29. 9. 2018].

He, K. et al. 2017. "Mask R-CNN". http://arxiv.org/abs/1703.06870 (last access July 11, 2019).

He, K. et al. 2015. "Deep Residual Learning for Image Recognition". http://arxiv.org/abs/1512.03385 (last access July 11, 2019).

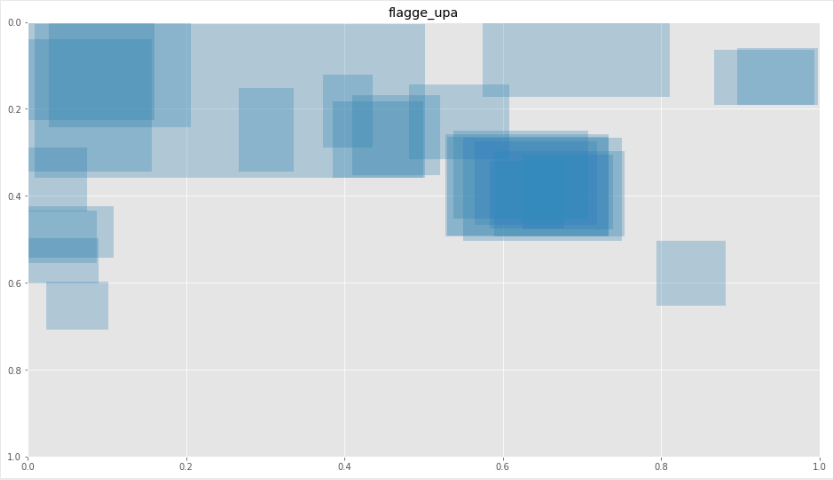
Bonus

Train/Eval/Test separation 75:15:10 (per class)

mAP per symbol

Flag of Ukraine: 0.51
Flag of UPA: 0.49
Ukrainian Coat of Arms: 0.63
Swastika: 0.80
SS runes: 0.69
Ribbon of St. George: 0.70
Hammer & Sickle: 0.72
Polish Coat of Arms: 0.75
Wolfsangel: 0.94
Symbol of OUN: 0.75
Swoboda: 0.58
Falanga: 0.93

Bounding boxes of a symbol



Corpus map (Isomap)