

Julien Cornebise, Ph.D.

2019/05/14 - UCL Space Week

BEARING WITNESS FROM SPACE

AI FOR GOOD?

E L E M E N T ^{AI}

 **UCL**

Our team at **Element AI**

Talent

550+ AI Enthusiasts, scientists, human-centric designers, AI developers, architects

100+ PhDs on staff

Global presence across five offices in North America, Europe, Asia.

London office: 13 persons

Leadership

Founders and executives with **decades of experience** advancing AI research and transforming businesses with AI



JF Gagné,
CEO

15 years leading disruptive decision and data science-based software companies



Yoshua Bengio,
Co-Founder

Father of Deep Learning, full Professor at UdeM and Head of Montreal Institute for Learning Algorithms

Values

People-first mindset that informs our approach to software development

- AI for good
- Augmenting and not replacing

A spirit of **open collaboration** at every step of our operations model

- Non-predatory academic model
- Consulting, technology and integration partners

Backed by leading VC,
corporate and institutional investors

Data Collective



Tencent 腾讯



We deliver AI-powered products across 6 key industries



Banking



Insurance



Capital Markets



Transportation &
Logistics

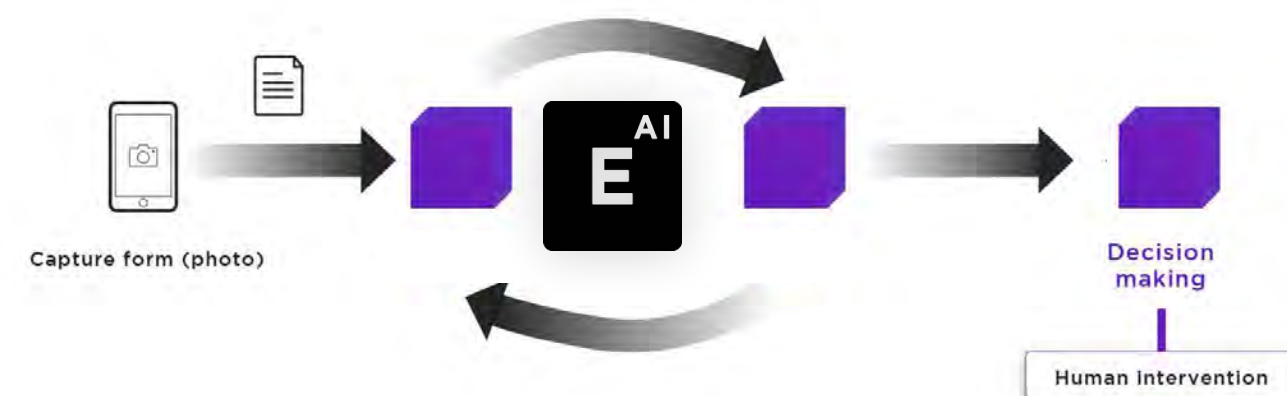


Manufacturing



Retail

Automated document processing: claims for a leading insurance firm



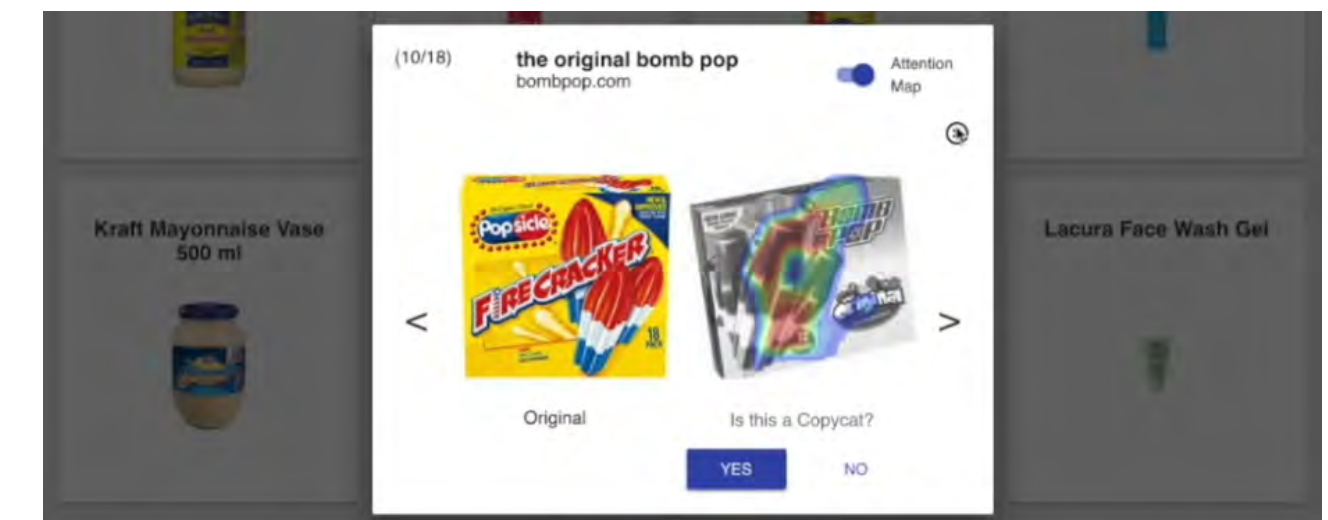
- Objective: Use AI to empower human analysts to have greater throughput when processing claims.
- Results: Optimized workflow by increasing automation from 14% to 45%

Operations orchestration: one of the largest ports in North America



- Objective: Predict best time to go to the port in order to minimize wait times.
- Results: Reduced wait times with 2x improvement in prediction accuracy

Copycat goods detection: for Fortune 200 retailer



- Objective: Develop a system with explainable UX for identifying copycat products.
- Results: Reduced time required to send legal letters from 7 months to 3 days

**“TECHNOLOGY – NO MATTER HOW WELL
DESIGNED – IS **ONLY A MAGNIFIER** OF HUMAN
INTENT AND CAPACITY.”**

Kentaro Toyama (2015)

AI FOR GOOD TEAM
13 PERSONS, LONDON-BASED

PARTNER HAND IN HAND WITH
DOMAIN EXPERTS: EMPOWER THEM

**AMNESTY
INTERNATIONAL**



UCL



Daniel Worrall
@deworrall92



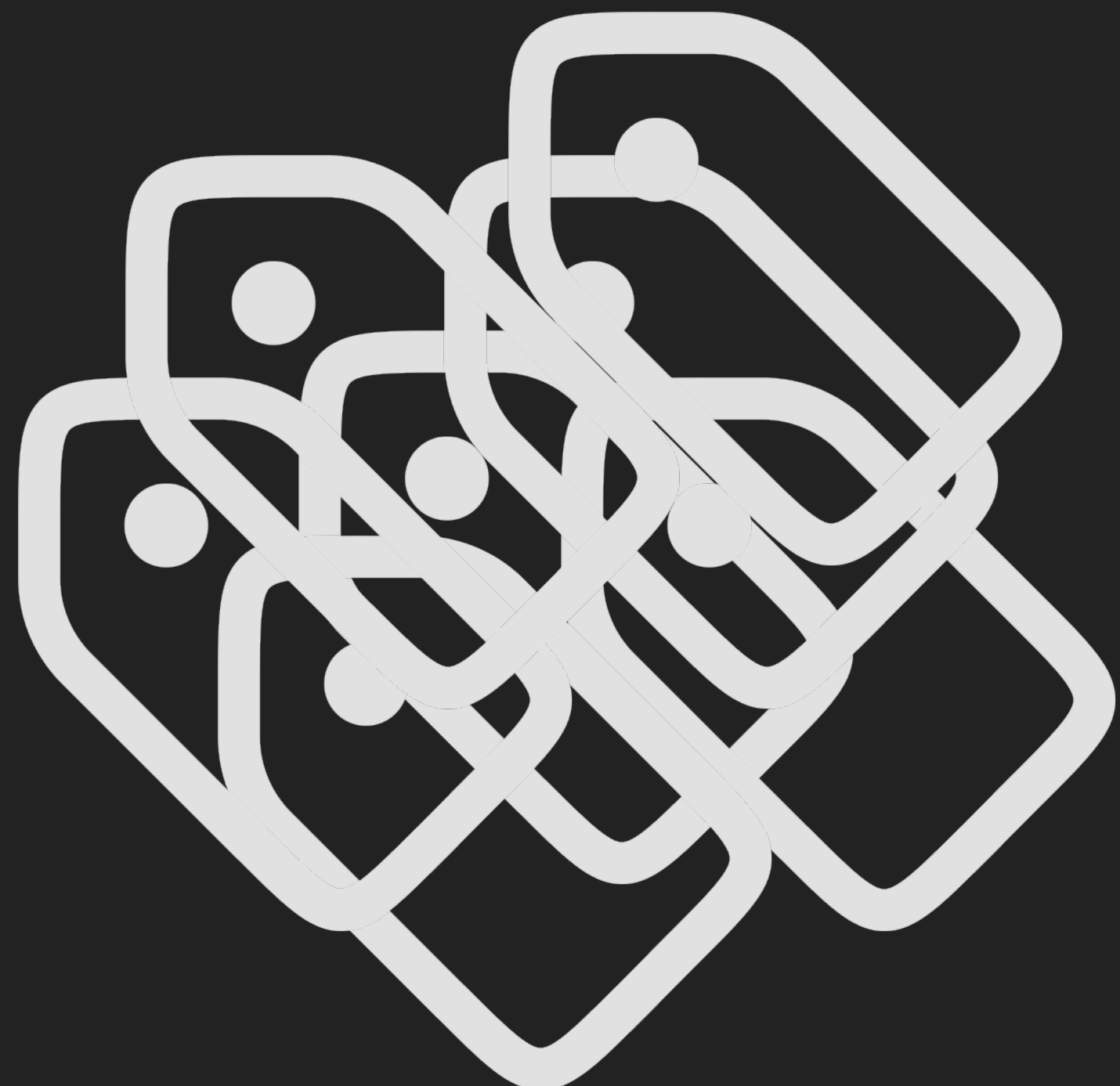
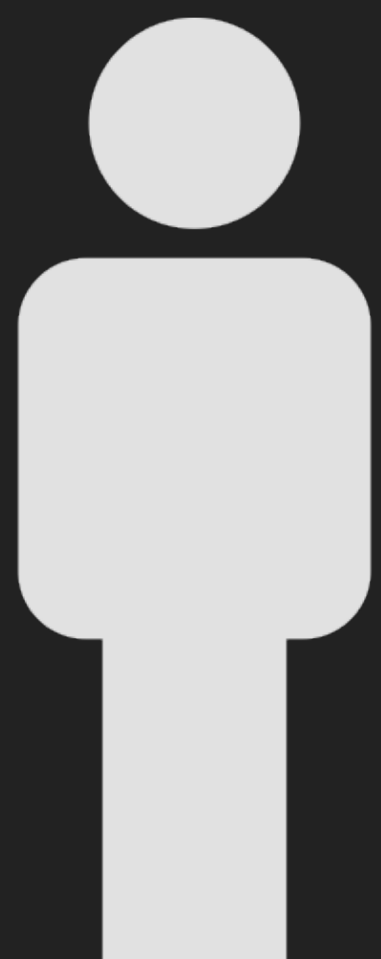
Milena Marin
@milena_iul

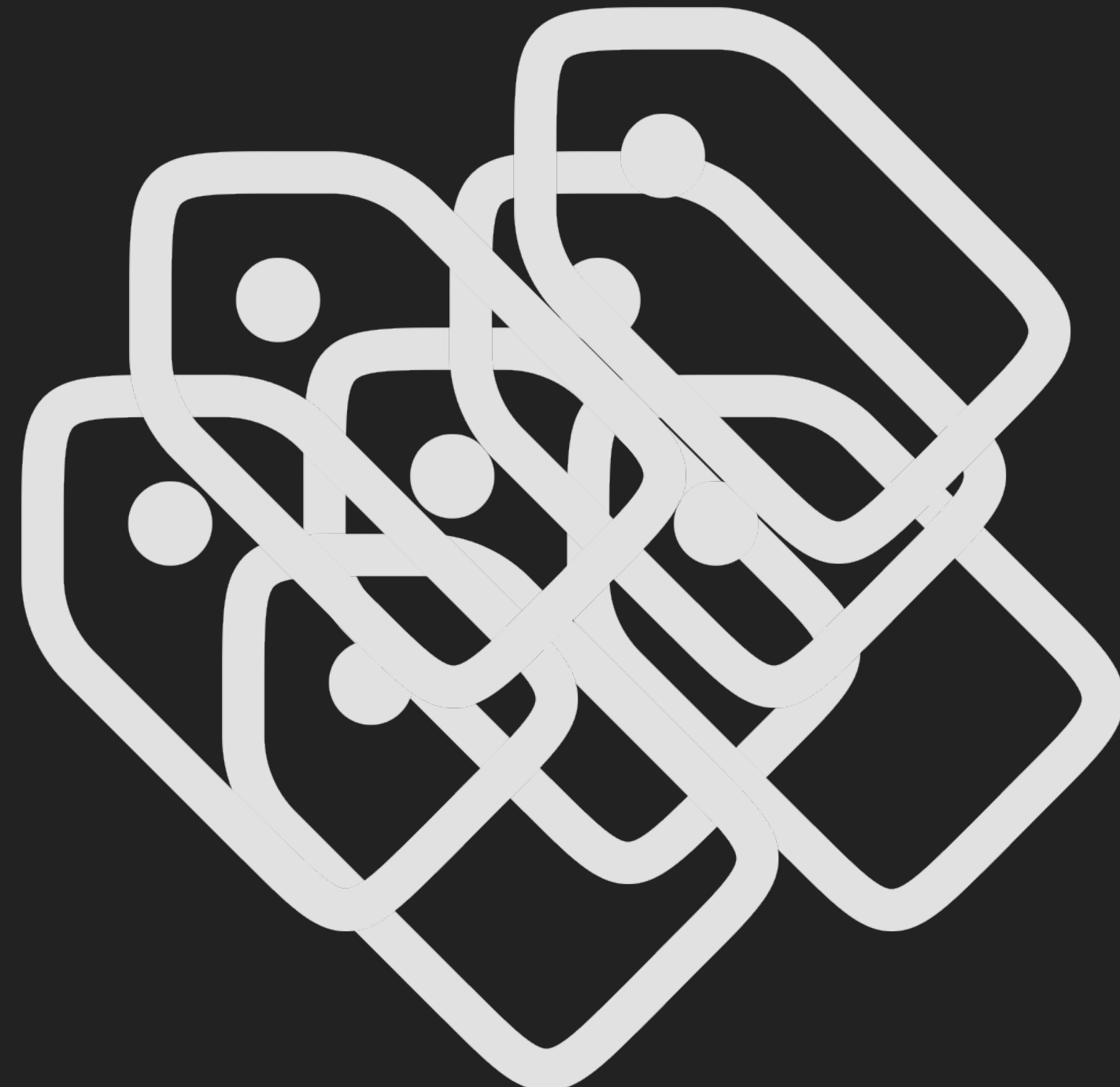
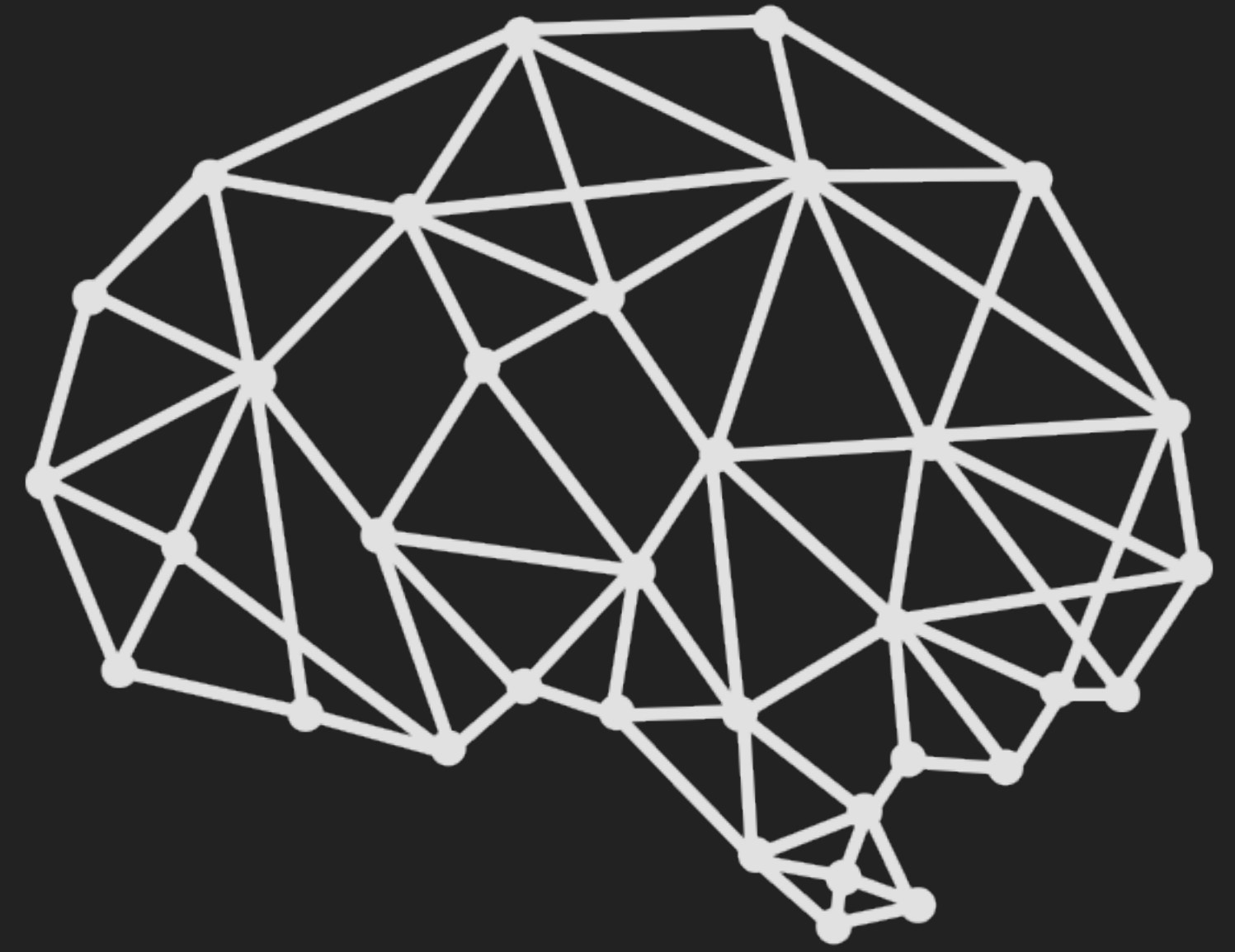
**2017 – DECODE DARFUR:
FINDING BURNED VILLAGES WITH
CROWDSOURCING AND NEURAL NETS**











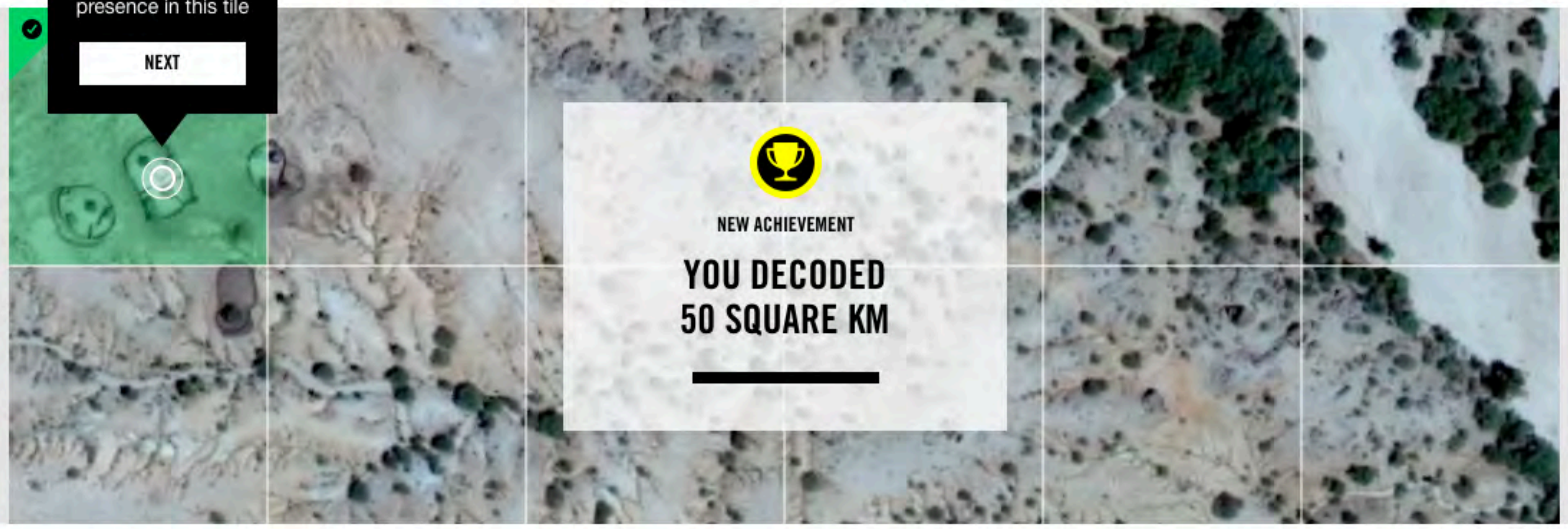
SELECT TITLES CONTAINING HUMAN PRESENCE

FLAG

HELP

Well done! You identified the human presence in this tile

NEXT



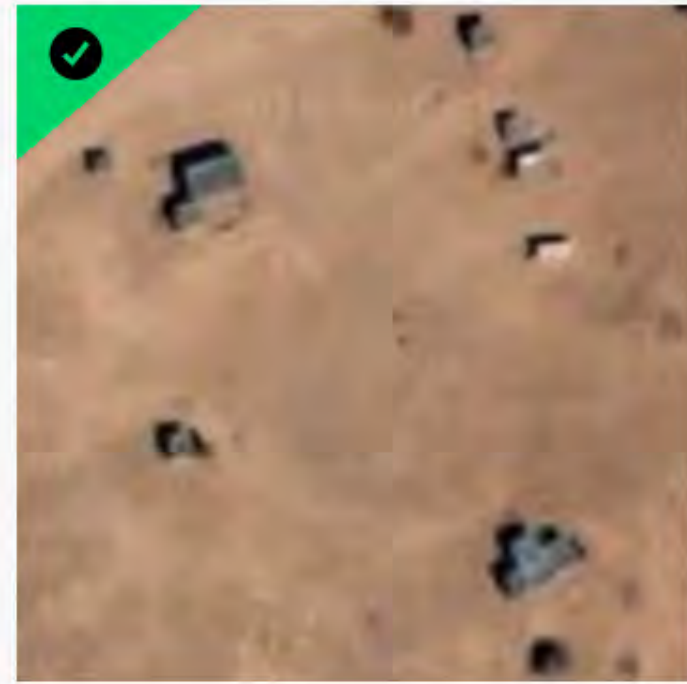
CONTINUE →

25
SQUARE KM
THIS SESSION

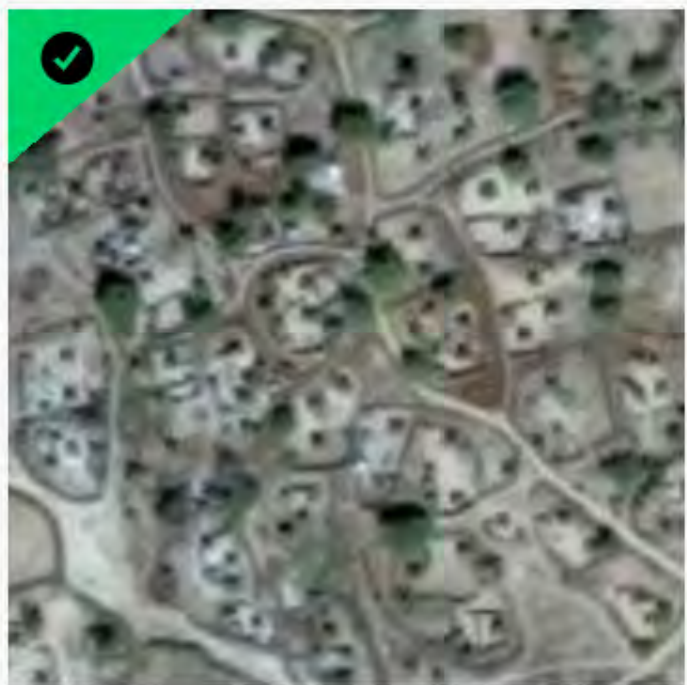
149
SQUARE KM
ALL SESSIONS

1659
SQUARE KM
ALL VOLUNTEERS

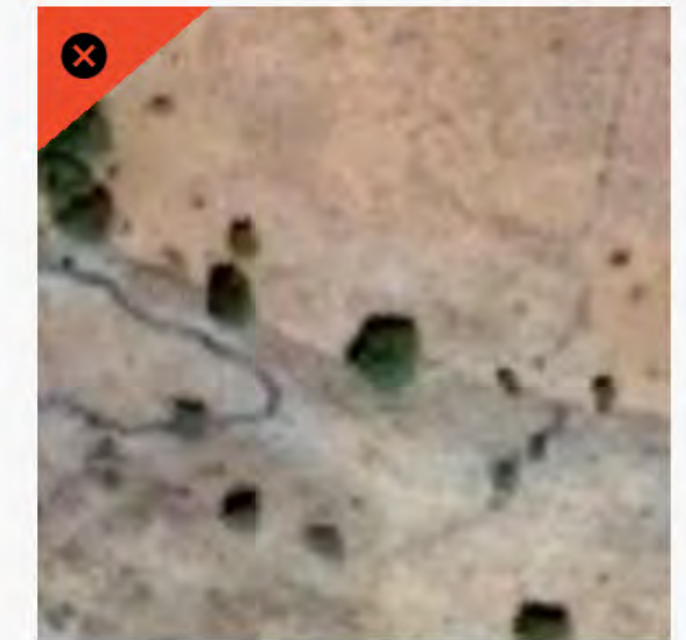
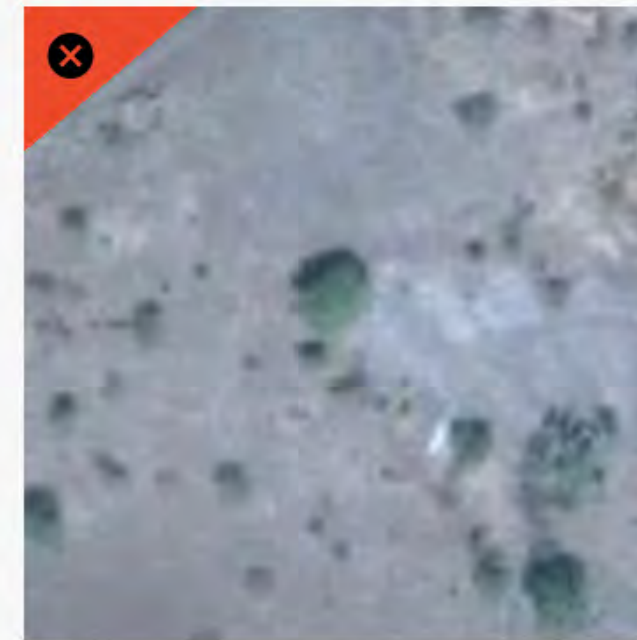
DEEP LEARNING TO DECODE DARFUR



✓ Metal roofs or other unnatural colour (can be isolated or in groups)

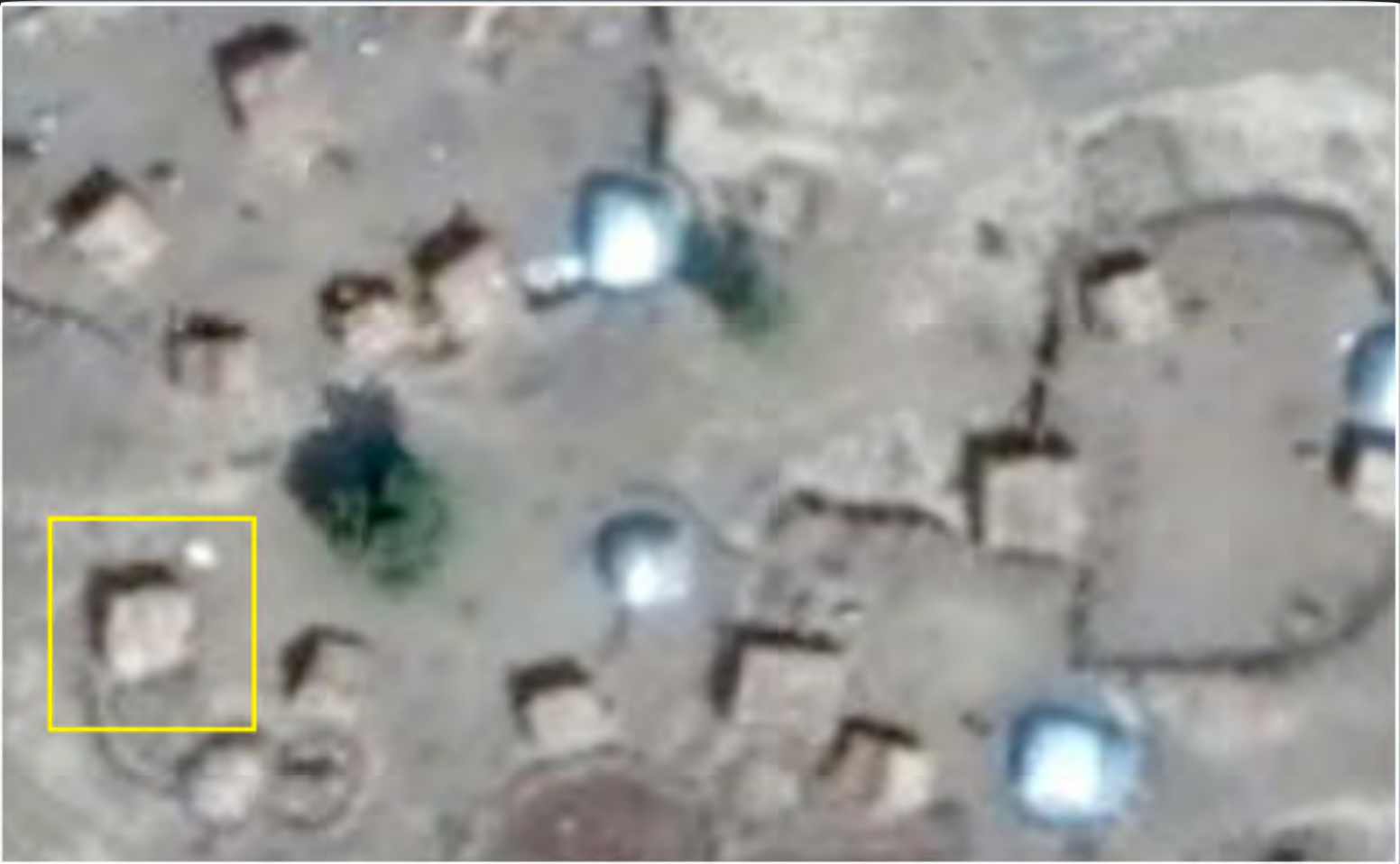
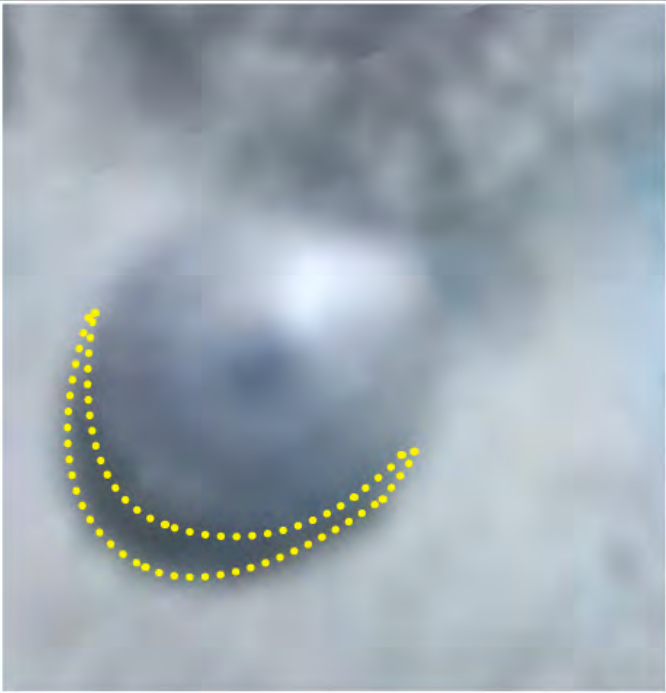
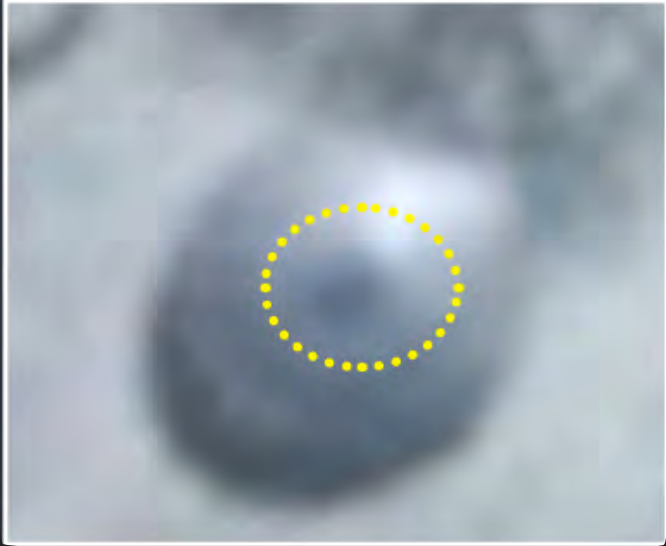


✓ Linear or circular features that enclose other objects
✓ Shadows (darkness) from the linear or circular features
✓ Many similar features clustered together

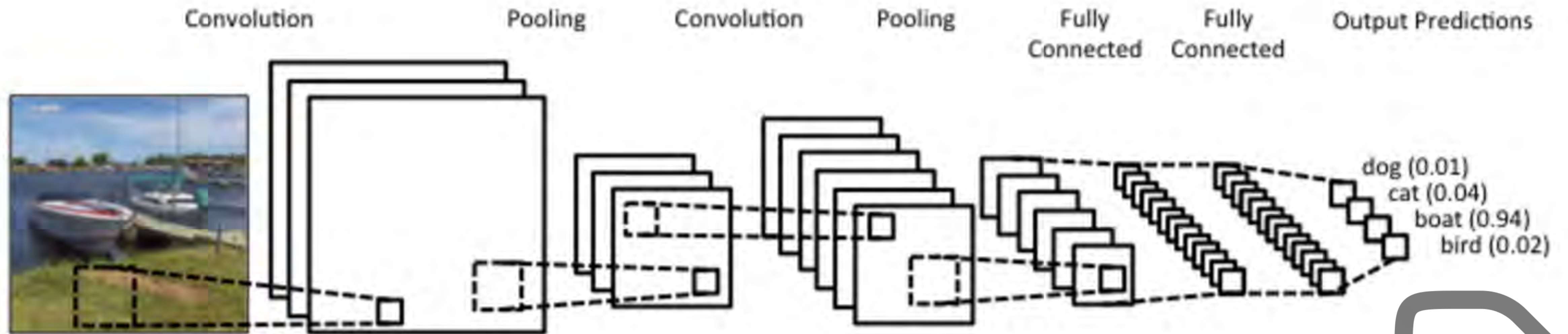


X Round, sporadic features, not enclosed, sometimes green

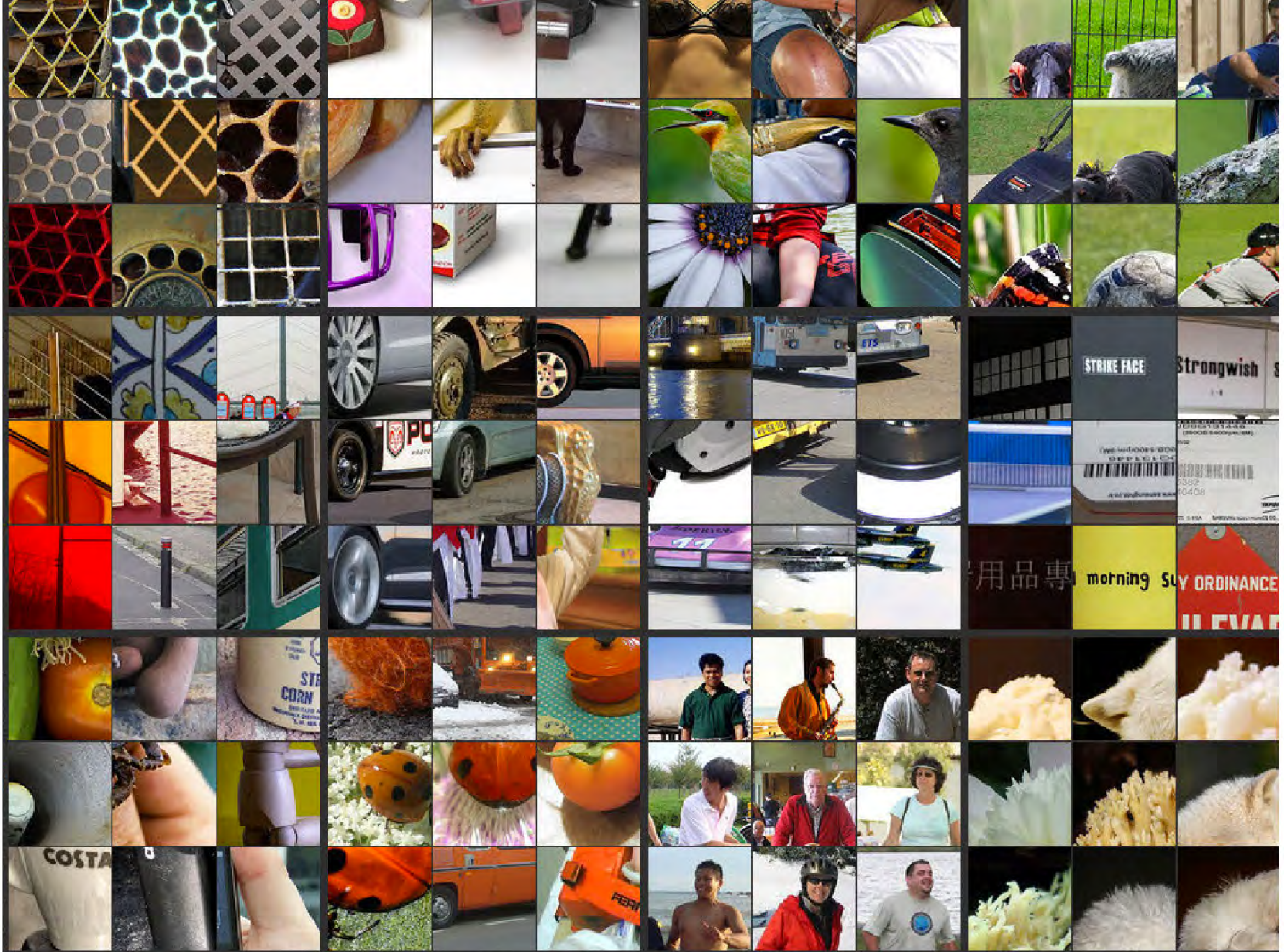
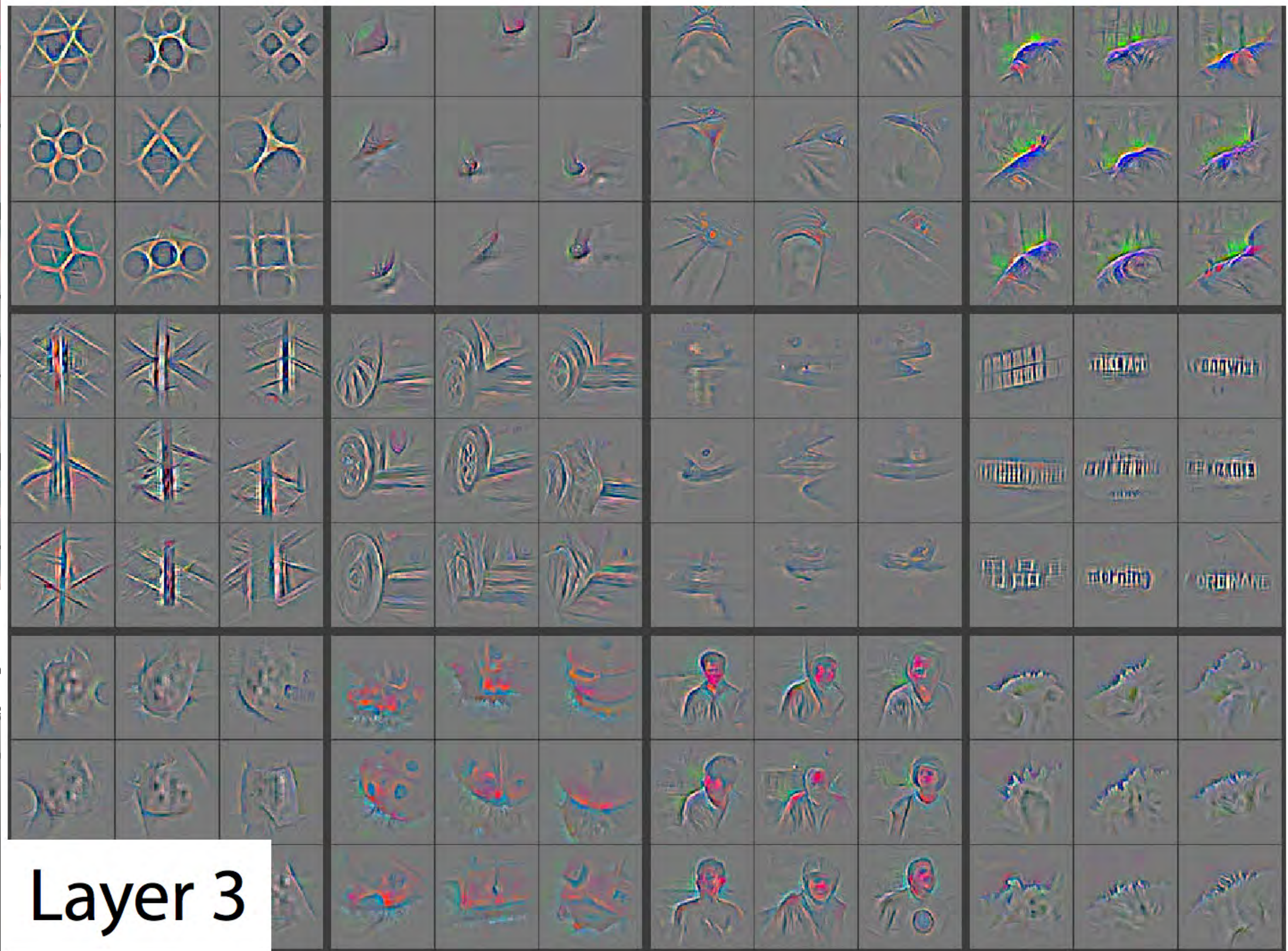
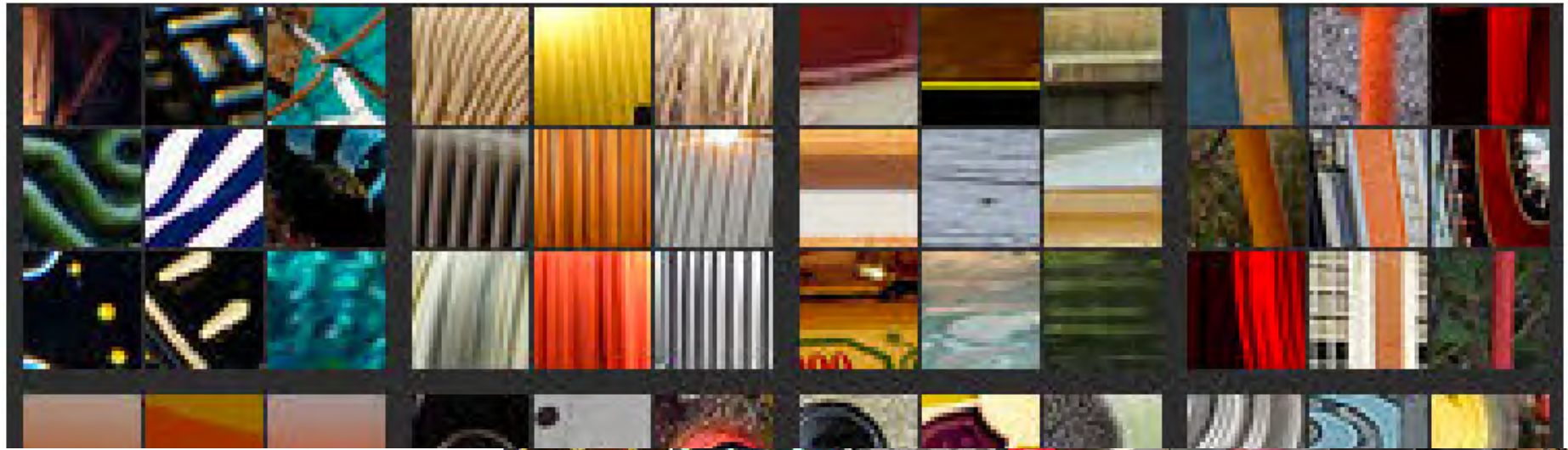
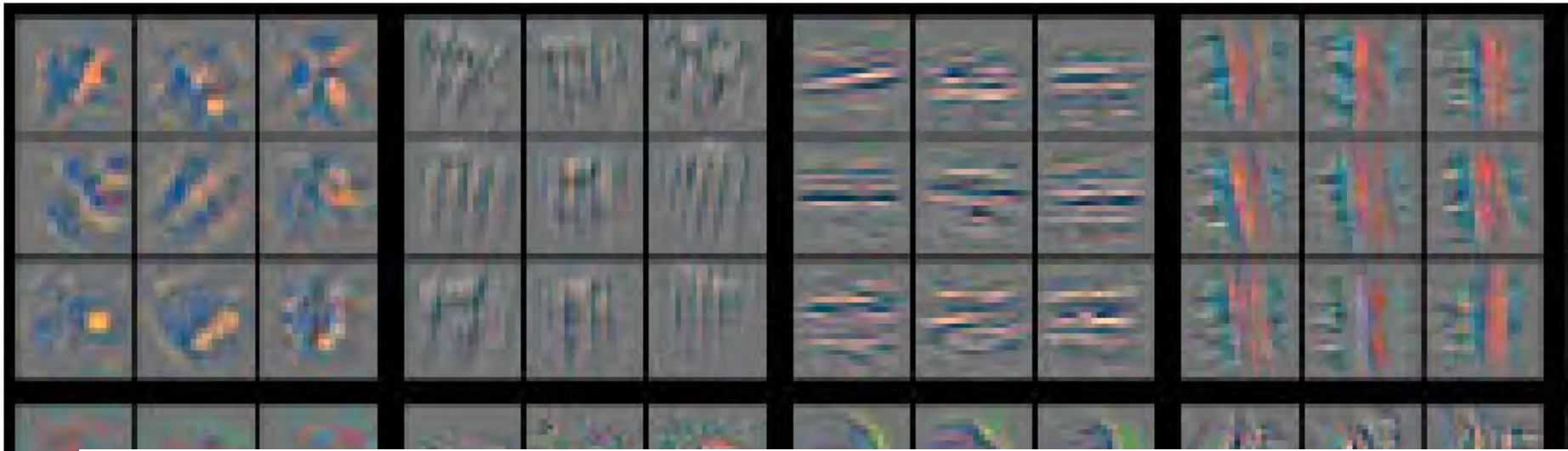




DEEP LEARNING: CONVOLUTIONAL NEURAL NETWORK



Layer 1



Layer 3

Layer 3

UNDER THE HOOD – DATA EFFICIENCY

- ▶ **Simple classification problem**
- ▶ **Crowdsourcing - quality analysis (Krippendorf, Precision/Recall), expert comparison**
- ▶ **ResNet50 pre-trained, iterative fine-tuning**
- ▶ **Heavy data augmentation**
- ▶ **From 1M natural images ...**
 - ▶ **...to 132K 2-class-balanced for human presence...**
 - ▶ **...to 8K tiles only 4-class-balanced for destruction**

HIGH-RESOLUTION VIDEO REMOVED FROM RECORDED TALK

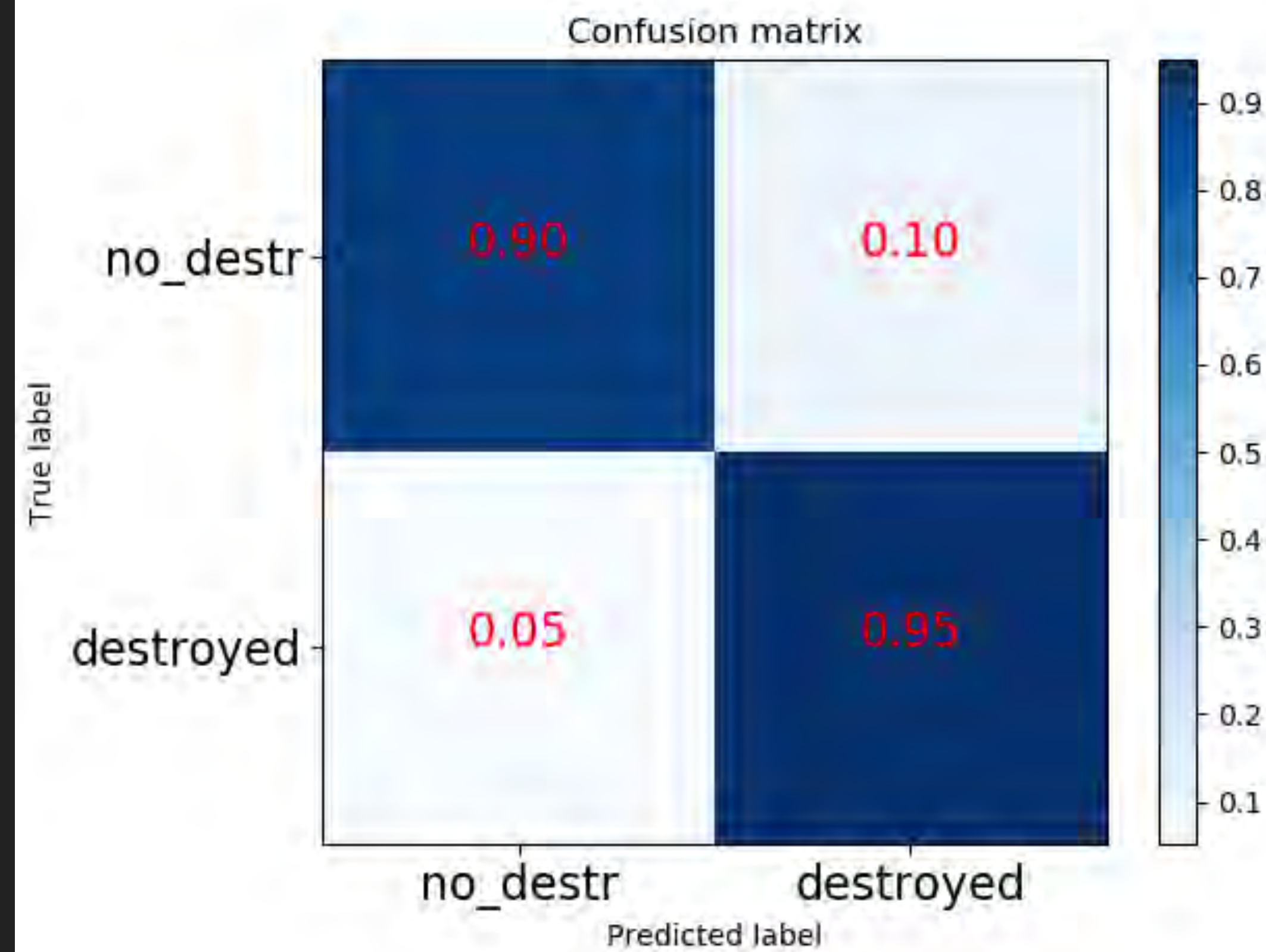
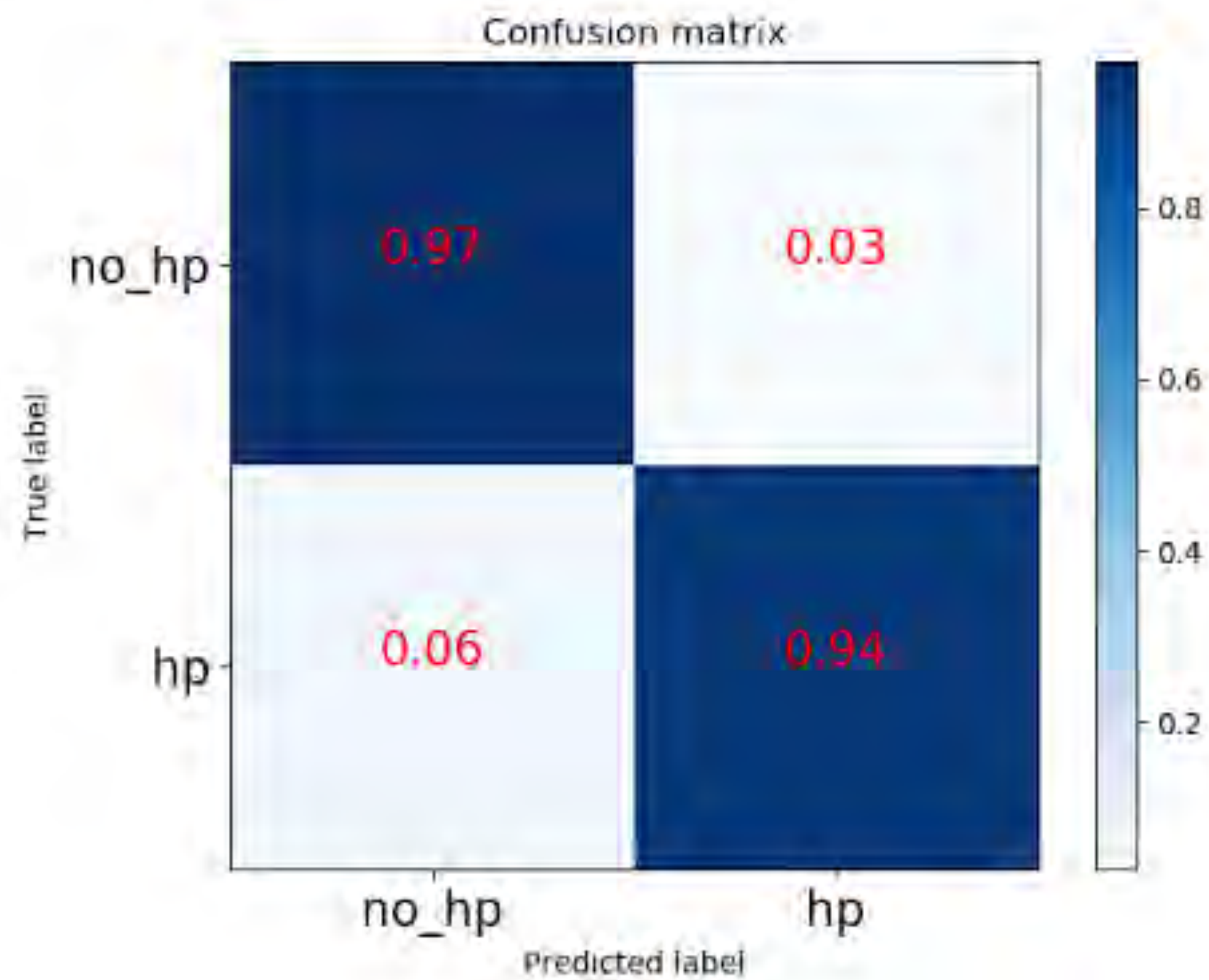
- ▶ Apologies, we cannot share online the video of the results, because the location of the villages found is sensitive.
- ▶ Instead, we have made available low-resolution screenshots in the next slide.



Green: villages

Urbanization
Villages in

Urbanization patterns in Uganda – out of country generalization
Micro-groupings of huts along criss-crossing roads



**AMNESTY
INTERNATIONAL**



"PATHWAY TO IMPACT"

**2018 - TROLL PATROL: STUDYING
ABUSE AGAINST WOMEN ON TWITTER**

Jul 13
Replying to @HackneyAbbott
this **fat** retarded black **bitch** thinks you should be forced to feed and house a bunch of violence foreign invaders. i strongly disagree.

Jul 13
@HackneyAbbott Piss off you disgusting useless **fat bitch!** You're a parasite **alien** looking to silence native people for your power.

Tasmina needs to be grabbed by the pussy. 🤢🤢🤢 #bbcqt
10/11/2016, 23:33

Tasmina needs to be poked with a massive dildo #bbcqt
10/11/2016, 23:36

Jul 14
Replying to @HackneyAbbott
You forgot "fat disgusting obese chicken-loving **nigger**"

Jul 14
Replying to @HackneyAbbott
An acid attack would probably make your face look better you fat **nigger**

Someone jo cox Anna sourby please
02/12/2016, 07:41 from Poplar, London

STUDY: ML TO HUMANS TO ML TO HUMANS

- ▶ Build a dataset with **ML prefilter**
- ▶ **Importance sampling** to
 - ▶ reduce variance
 - ▶ drive engagement
- ▶ **Human Crowdsourcing**
- ▶ **Data Analysis with Bootstrap**
- ▶ **Train Deep model and benchmark**
- ▶ **Carefully and expertly report and go public!**
 - ▶ **Very sensitive topic, human rights expertise!**



TROLL PATROL FINDINGS

Using Crowdsourcing, Data Science & Machine Learning to Measure Violence and Abuse against Women on Twitter

Welcome to the findings of our Troll Patrol project: a joint effort by human rights researchers, technical experts and thousands of online volunteers to build the world's largest crowd-sourced dataset of online abuse against women.

Our findings reveal the sheer scale and nature of online abuse faced by women and provides a resource to researchers and engineers interested in exploring the potential of machine learning in content moderation.

These findings are the result of a collaboration between Amnesty International and **Element AI**, a global artificial intelligence software product company. Together, we surveyed millions of tweets received by

CONCRETE IMPACT

- ▶ **Massive coverage**
- ▶ **Twitter stock tumbles -13% in one day**
 - ▶ **2.5 Billion USD wiped off**
- ▶ **Incentive to open up, reach out, act**
- ▶ **Twitter CEO spoke with Amnesty SG**
- ▶ **Twitter ML team reached out**
- ▶ **To be continued...**



THANK YOU!

julien@elementai.com