BINOCULARS POWERED BY AI – ARE YOU KIDDING?

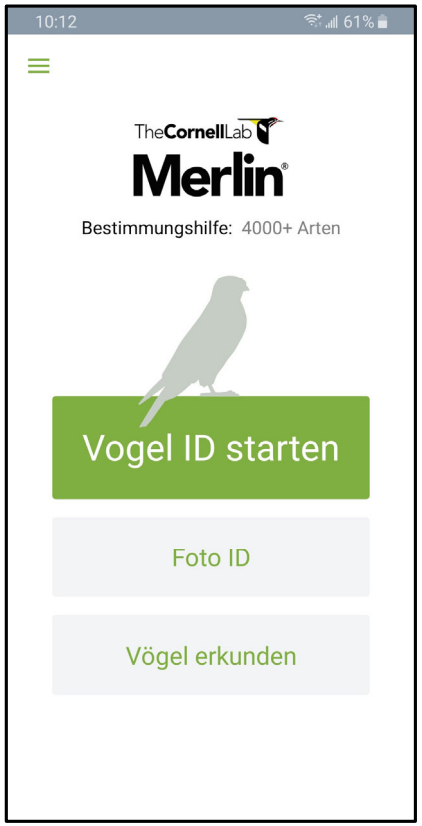
WHY EMBED AI ON BINOCULARS?

USER JOURNEY

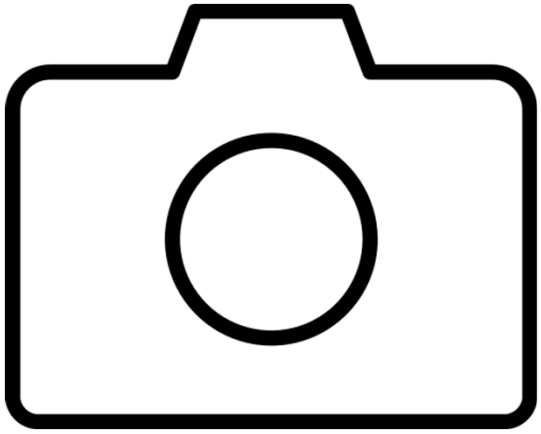
ASSUMPTIONS

WHAT IS NEEDED?

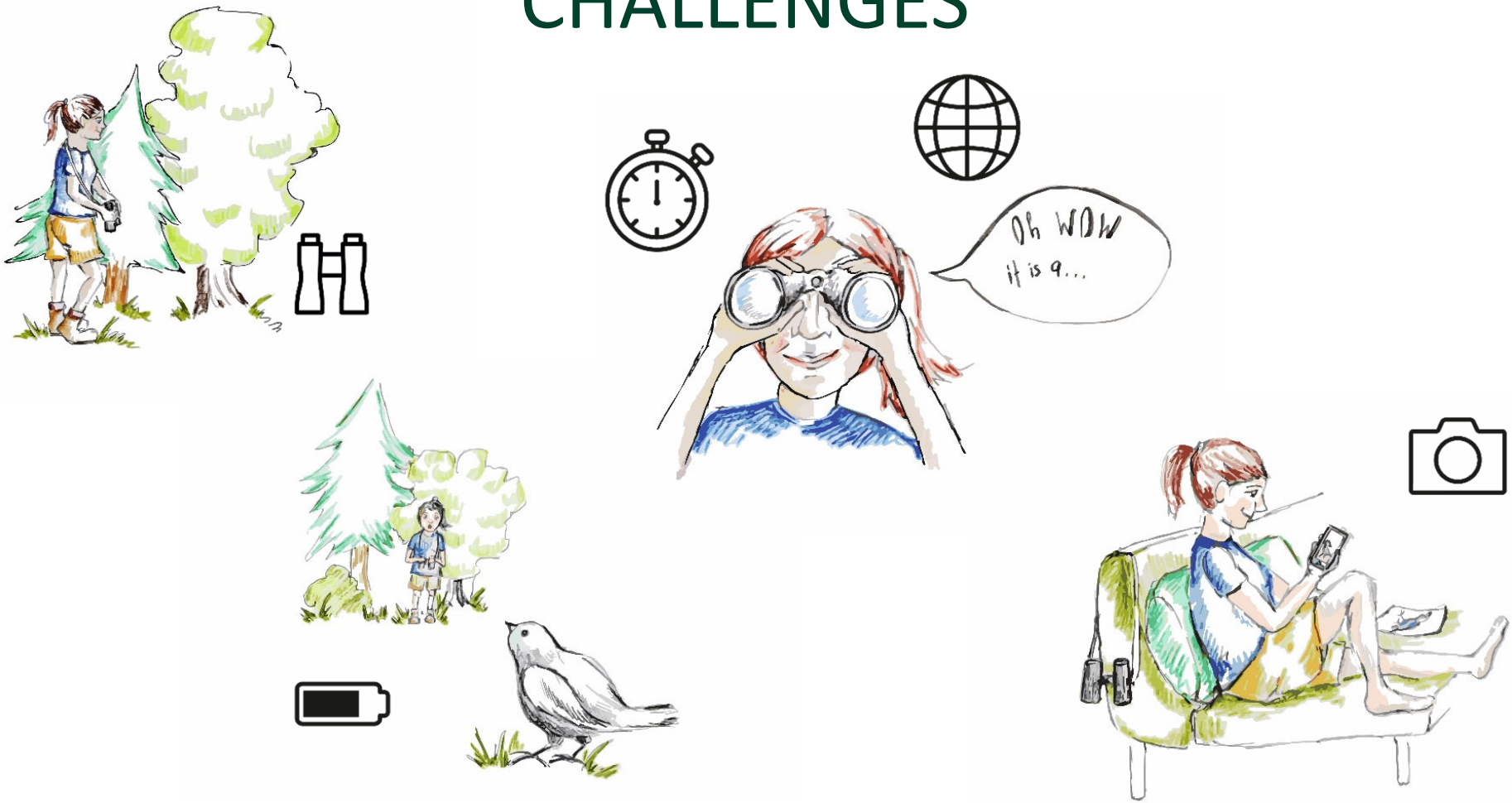
+



+



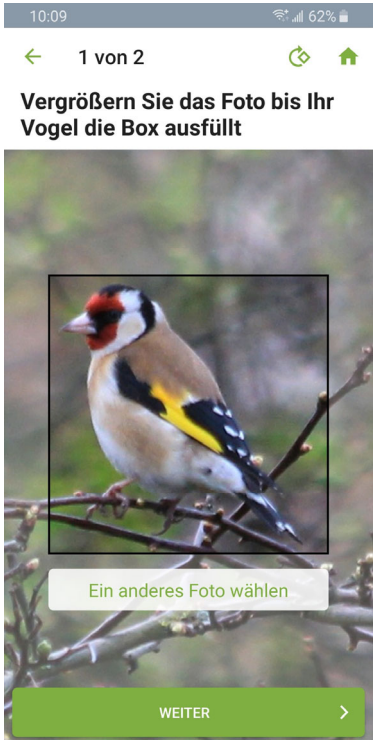
CHALLENGES



1ST APPROACH

GOALS

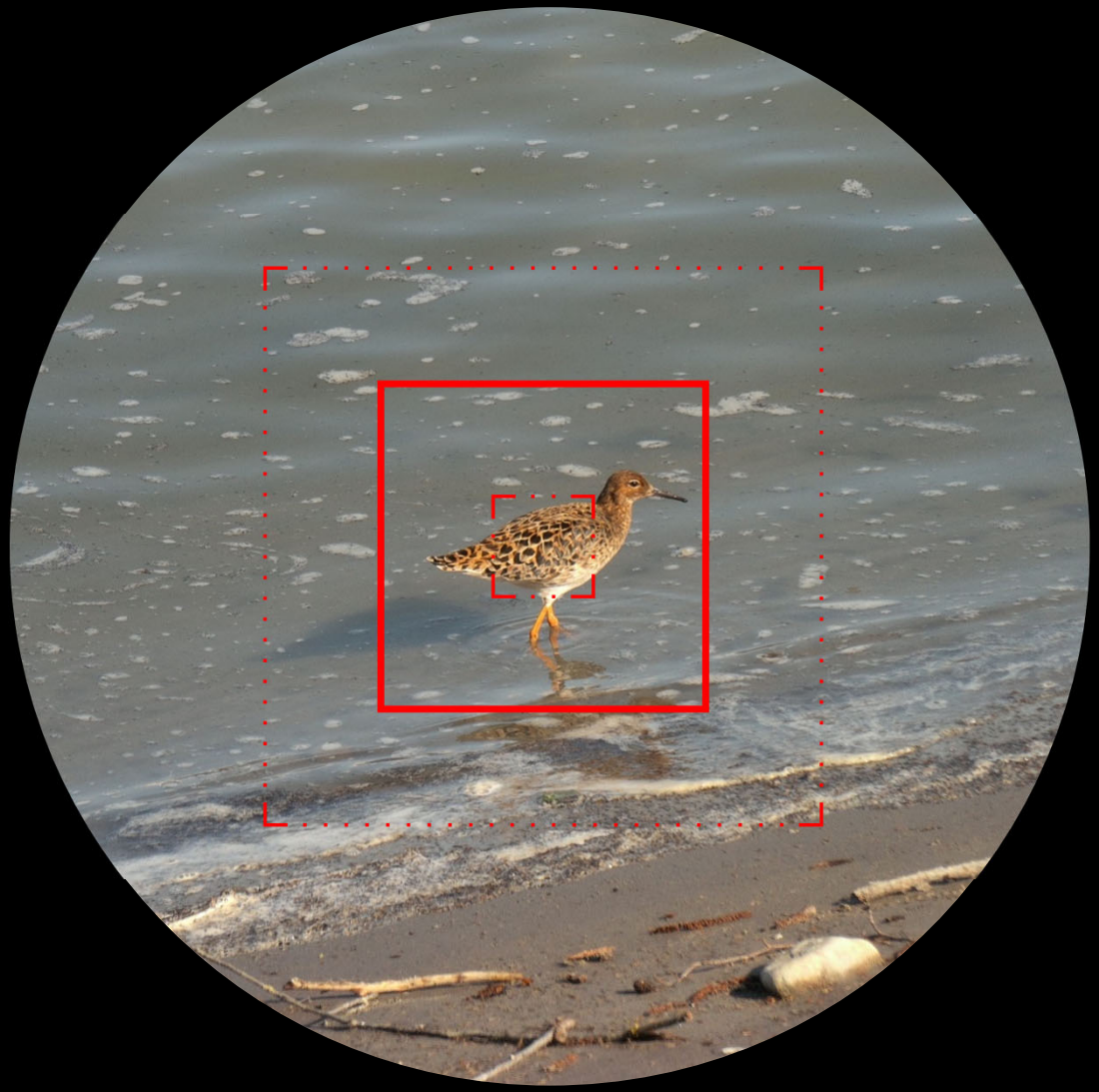
- Small birds identifiable at a distance of 50 m
- 7000 bird species globally
- ID process should be running offline
- At least 200 IDs with one battery charge
- ID result should be shown within less than 1.8 seconds
- 86% correct results if picture sharp, well-balanced exposure, neutral coloring, …



How to transfer the workflow of the Merlin App to binoculars?

Wanderfalke
Falco peregrinus

FIRST PROTOTYPE



Ruddy Turnstone

White Wagtail

FIRST RESULTS

Very first results looked promising → around 50% correct IDs

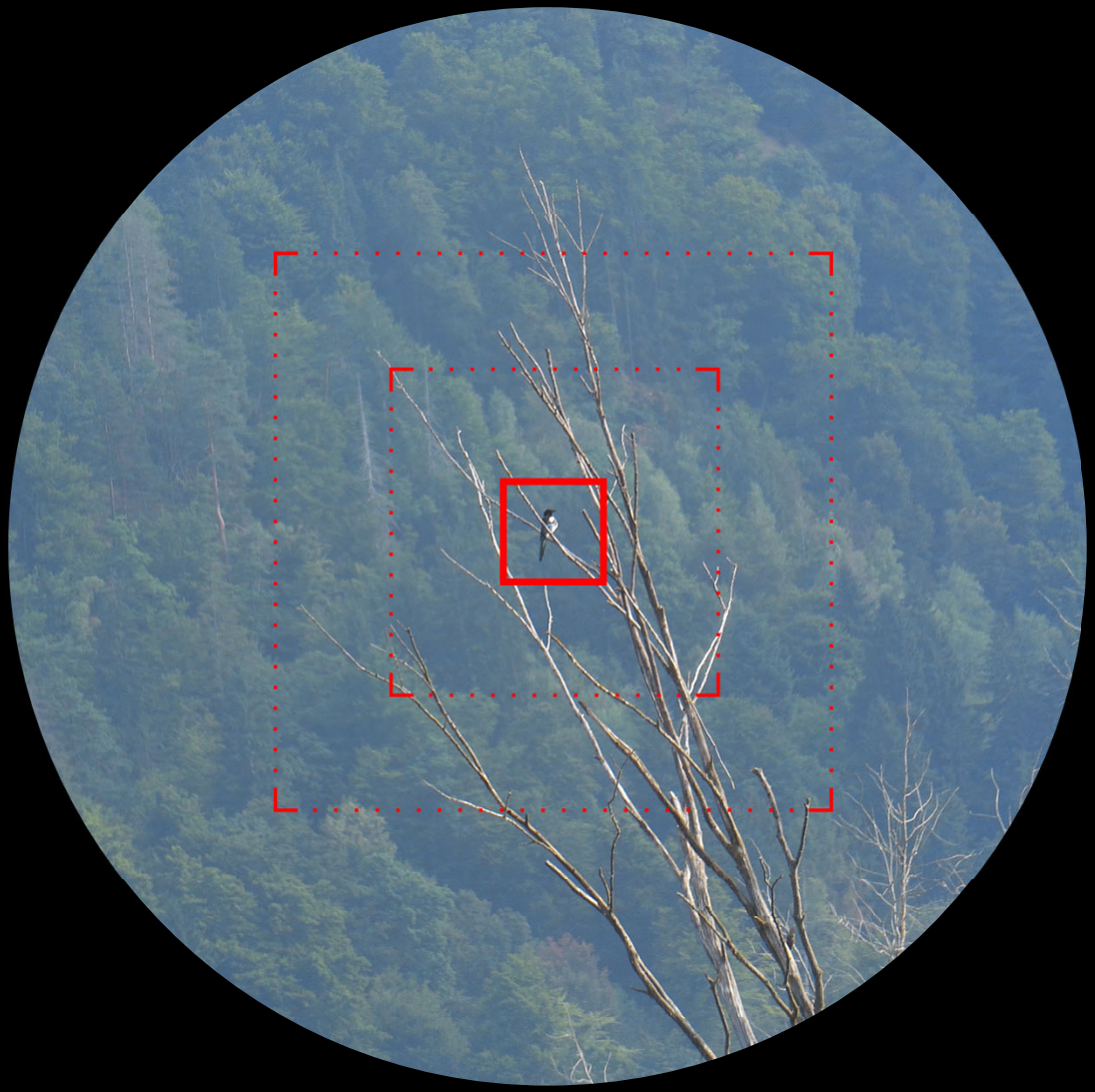
Variety of challenges discovered

User expectation is quite high – premium optics vs. camera picture quality

Mismatch of what you see and what the system has available for doing IDs

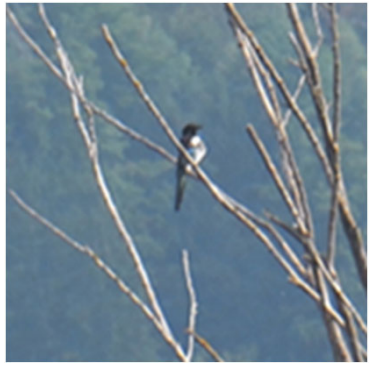
A lot of wrong IDs (small birds, poor quality pictures)

Shooting game factor

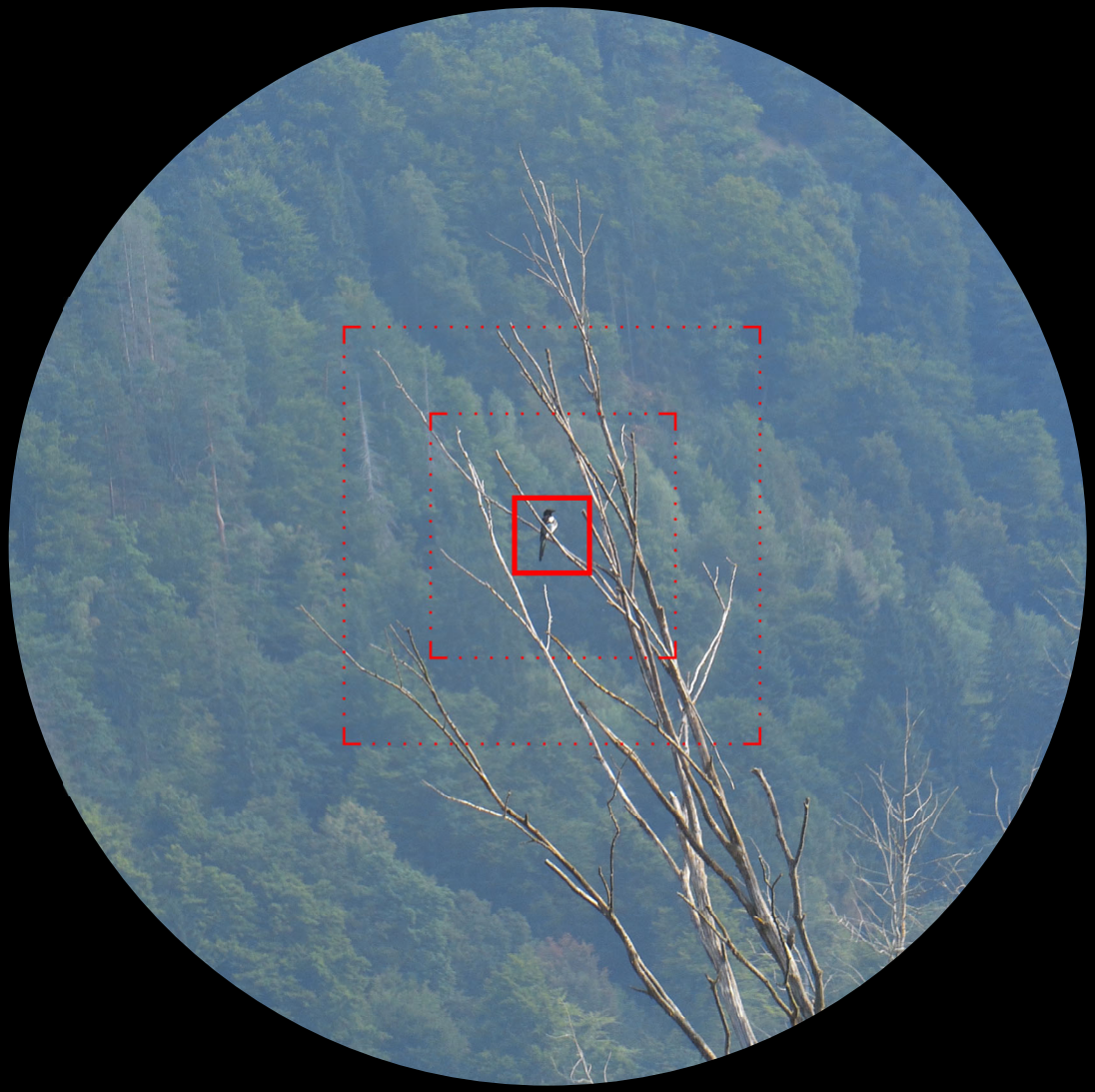


No bird recognized

KEY LESSONS

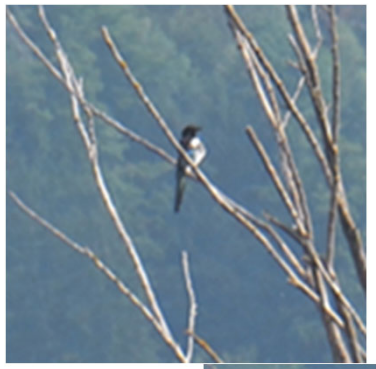


Quantity of background has a direct influence on accuracy



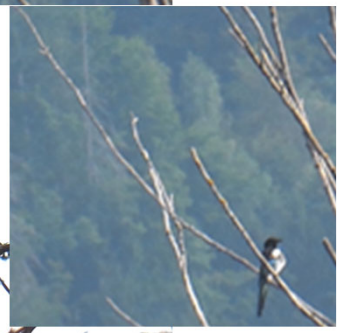
Eurasian Magpie

KEY LESSONS



Quantity of background has a direct influence on accuracy

Impossible to keep bird in the smallest reticle if not a professional bino user



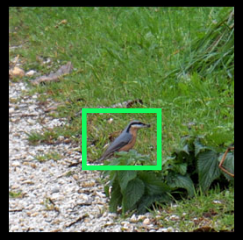
Even the position of bird within crop has an impact

No possibility to sort out really bad pictures or if bird is (partially) hidden

2ND APPROACH

Crop

Detect



Crop

DETAILS

- Detector feedback assists the user to start the ID process at the right moment

  Detector inference time less than 200 ms needed – HW acceleration is a MUST

- Detector trained for bird and no bird situations vs.

- Still two different reticles sizes needed

USER EXPERIENCE

White Wagtail

Eurasian Magpie

Bird not recognized
Bird too small

TAKEAWAYS

LESSONS

- Having a lot of high-quality data is a MUST, but not the ONLY thing that matters
- Conversion for HW acceleration is critical
  - only a few state-of-the-art models can be converted
  - causes non-negligible loss of accuracy
- End-to-End pipeline for validation; on Server and in App on device
- Balanced validation dataset (that represents user situations)
- User experience and providing feedback + advice is key

LAUNCH AT CES 2024

AX VISIO
THE FIRST
SMART
BINOCULARS
SWAROVSKI
OPTIK
#CES2024
Consumer
Technology
Association
100
YEARS

The world belongs to those who can see beauty.
Experience the moment. SEE THE UNSEEN.