INRAe

> # LIB: an initiative to built sharable AI tool for monitoring livestock behavior

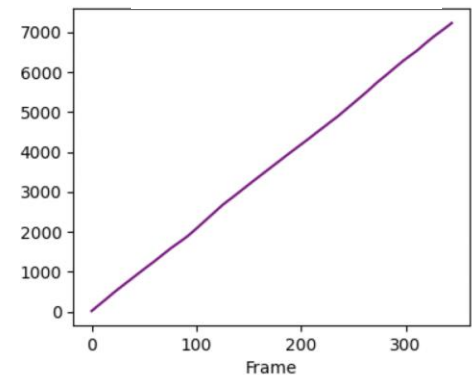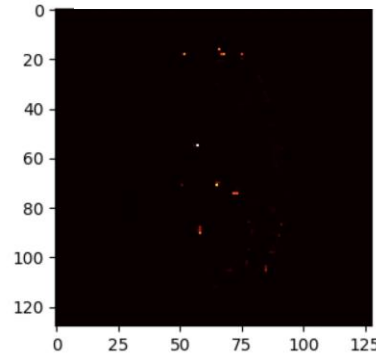Mathieu Bonneau, Céline Coupechoux, Erwan Desterbecq

INRAE ASSET - UR143 - Petit-Bourg, Guadeloupe

Introduction

Postural Time Budget

Level of activity

Spatial distribution

Time at feed zone

Animal detection:
- Body/Head
- Lying/Standing

Interesting behavioral statistics:
- Postural time budget.
- Spatial distribution.
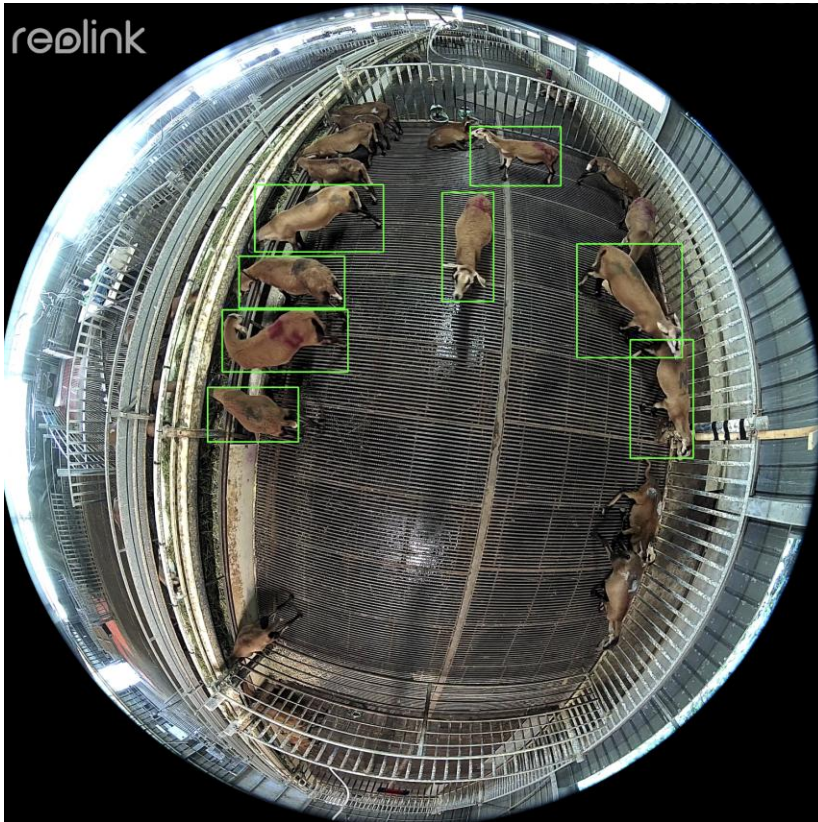- Level of activity.
- Time in zone
- …

Quantitative ethology

- Potential to:
  - Perform <u>long term</u> monitoring.
  - Measure <u>a lot</u> of different behaviors …
  - With just one ~200€ camera.

- Use the recorded data to:
  - Derive health/welfare indicators.
  - Learn more about animal behavior.
  - PLF.
  - …

- Grow interesting collaborations:
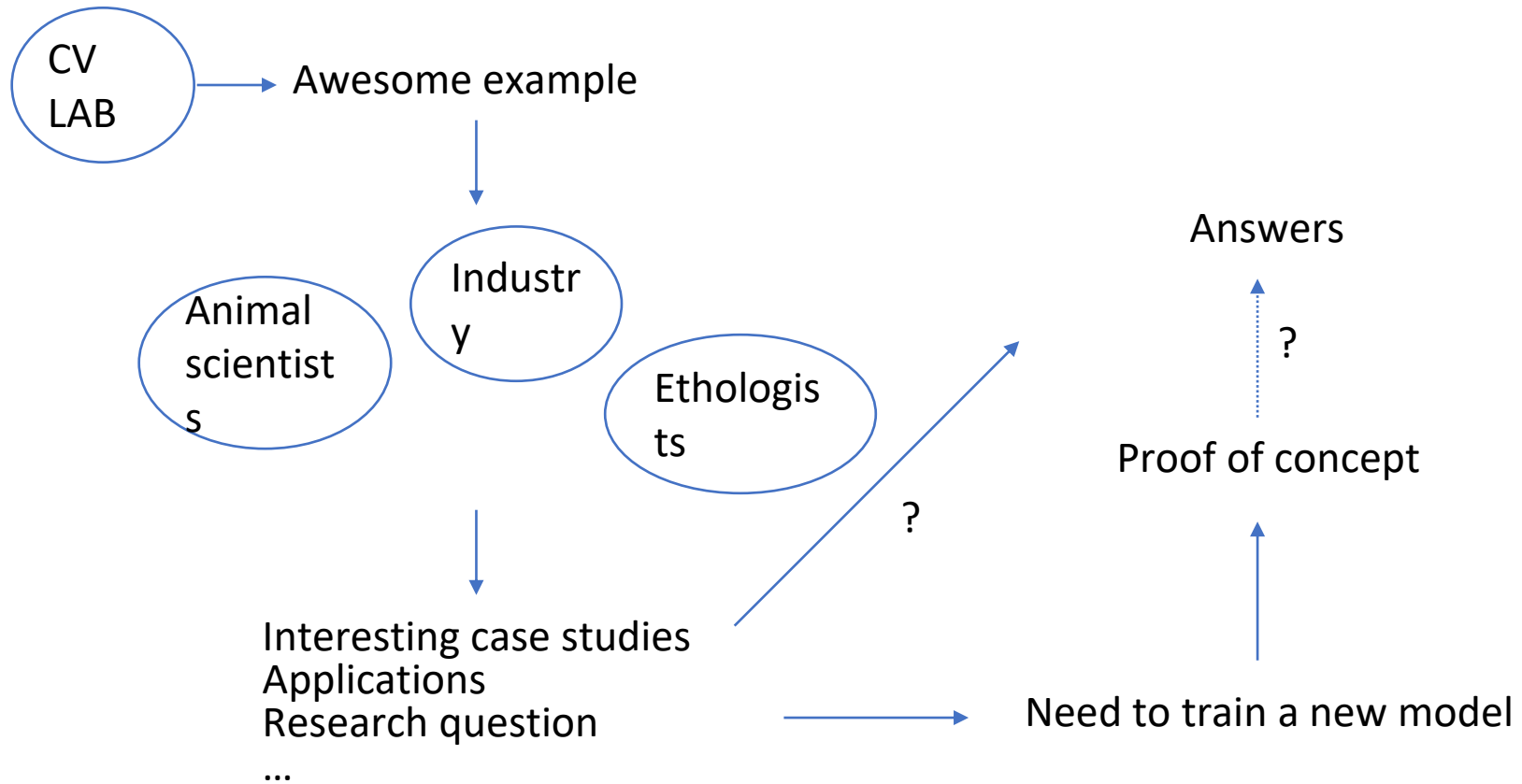 - Ethologists, physiologists, genetics …
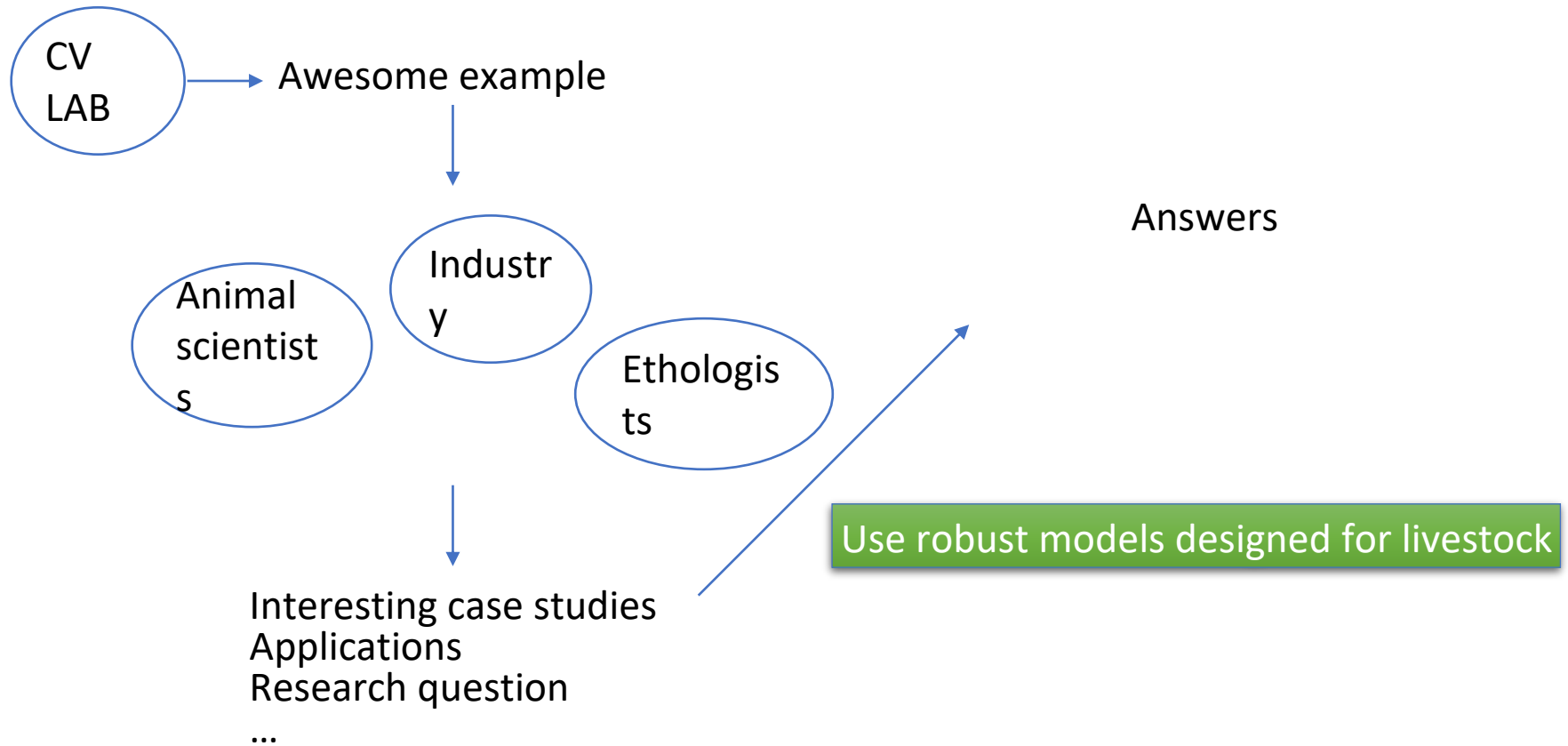
Quantitative ethology   or Annotation?

- New set-up (species, camera…):
  - Major loss of accuracy (nothing is working…).

- New project starts with:
  - Need to annotate images.
  - Who's gone do that?
  - How many images do we need?
  - On which computer do we train?
  - New behavioral variable.

- Expectation:
  - Use behavior data to answer a very interesting research question.

- Reality:
  - Image annotation.
  - Yolo training.
  - Yolo validation.
  - Few time for the research question …

Classic scheme
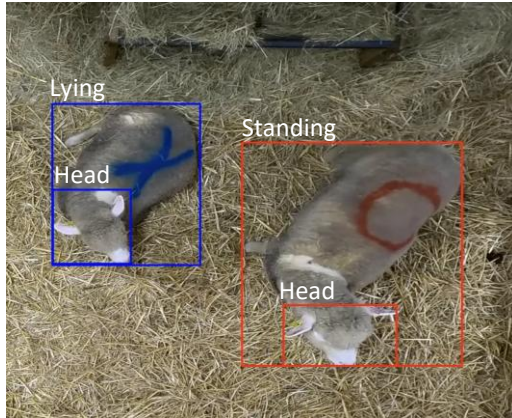
Classic scheme

CV LAB → Awesome example

Answers

Industry

Animal scientists

Ethologists

Use robust models designed for livestock

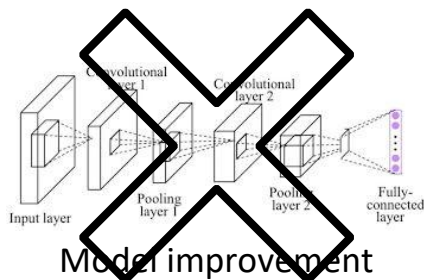Interesting case studies
Applications
Research question
…

LIB: Livestock Images Behavior

What ?

- Objects detection:
  - Head.
  - Body with posture (Lying/Standing/Transition).
  - Human.
  - Piglets.

- Yolo model.

- Multi-Species (goats, sheep, cows, pigs, chickens).

How ?
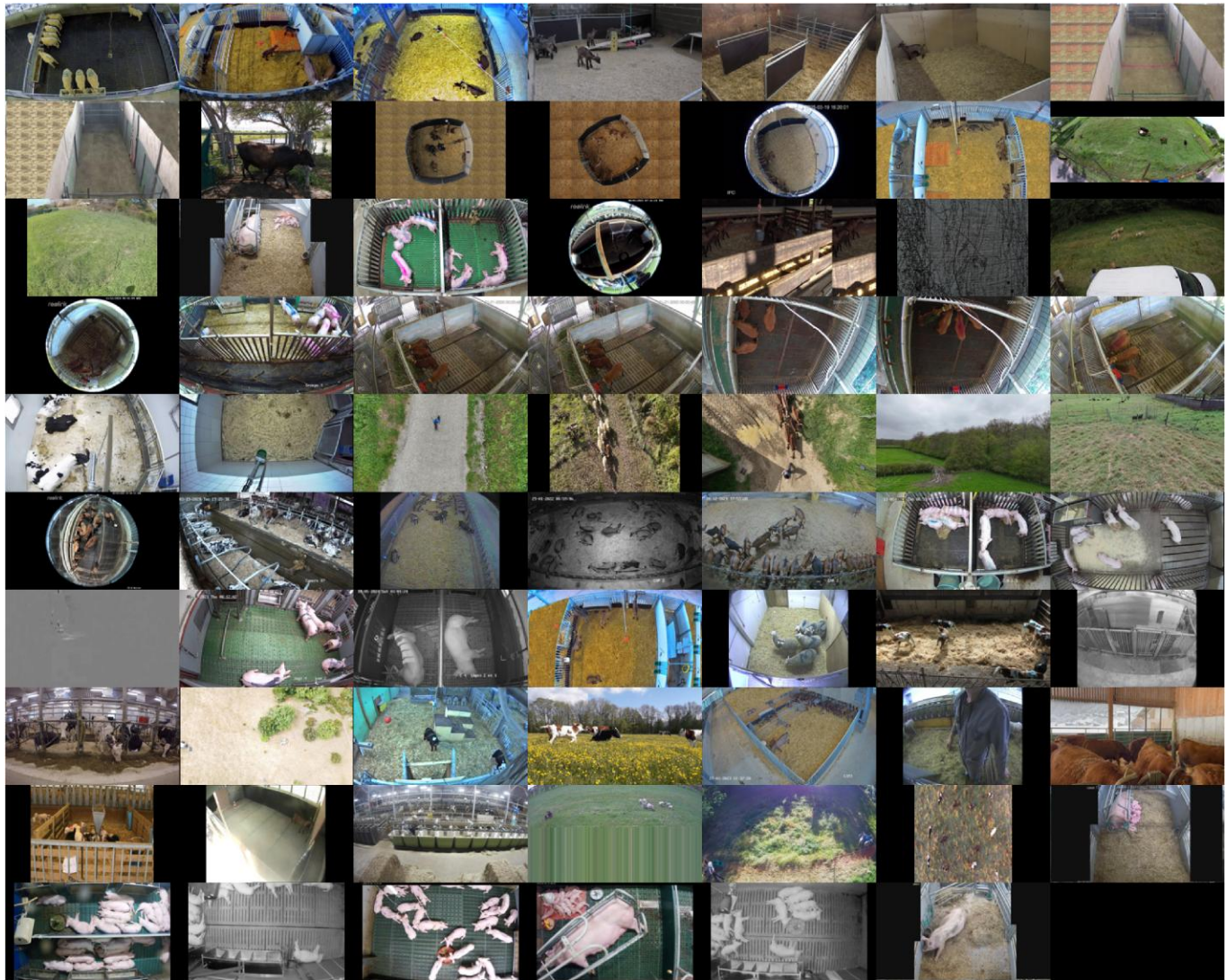

Model improvement

- Build an appropriate annotated dataset:
  - Diversity !
  - Accuracy !

- Hired two persons for annotation.

- Rely on collaboration with the scientific community.

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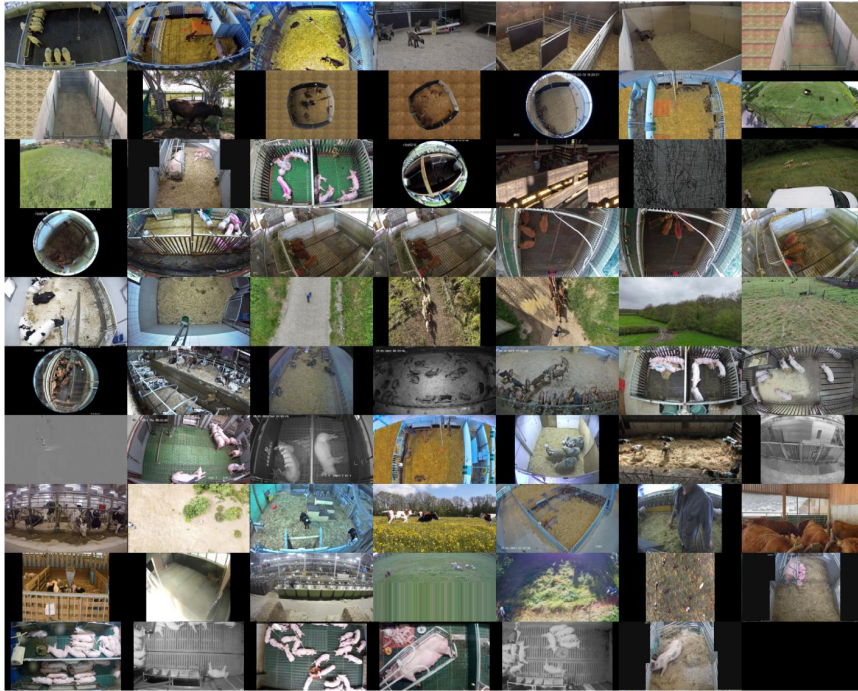
LIB so far

LIB so far

- Almost 30,000 annotated images.

    - Mainly small ruminants and pigs.
    - Fewer contribution for cattle and chickens.

- One server for sharing images.

- Special care for images with humans.

- Images from researchers (mostly France).

- Images from public datasets:

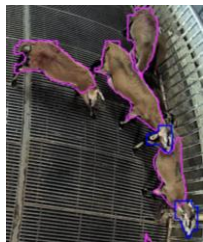   - COCO.
    - Robowflow.
    - Articles.

LIB: Expected Outputs

- **Annotated BDD:**

  - Publicly available.

  - Yolo format.

  - Associated data paper.

  - Trained Yolo model.

  - (Add segmentation.)

- **An encouraging example of open science?**

  - Open the door to a new era of behavioral studies?

  - Study fine behavior?

  - Quantitative ethology (using mathematical models to study behavior).

  - AI = data?

- **Want to contribute?**

  - E-mail to mathieu.bonneau@inrae.fr

  - Project end August 2025 …