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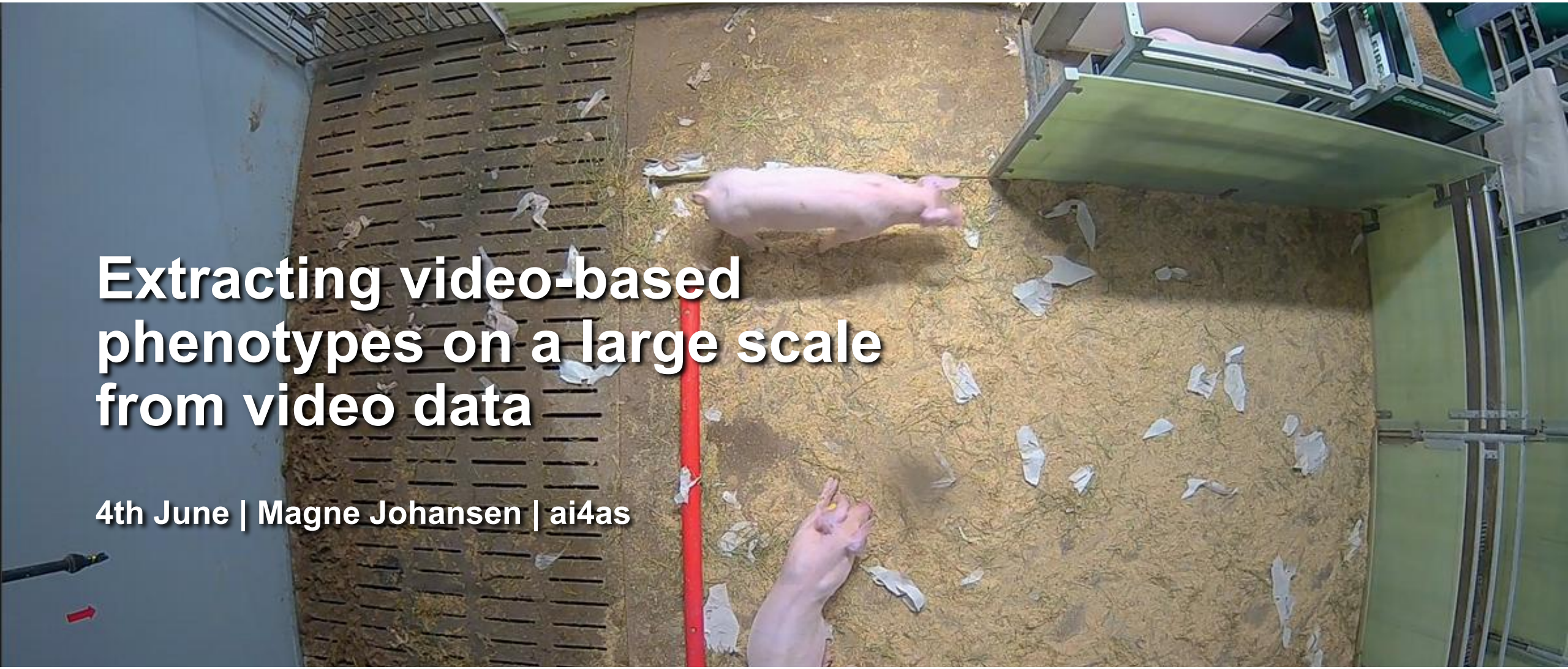

Extracting video-based phenotypes on a large scale from video data

4th June | Magne Johansen | ai4as

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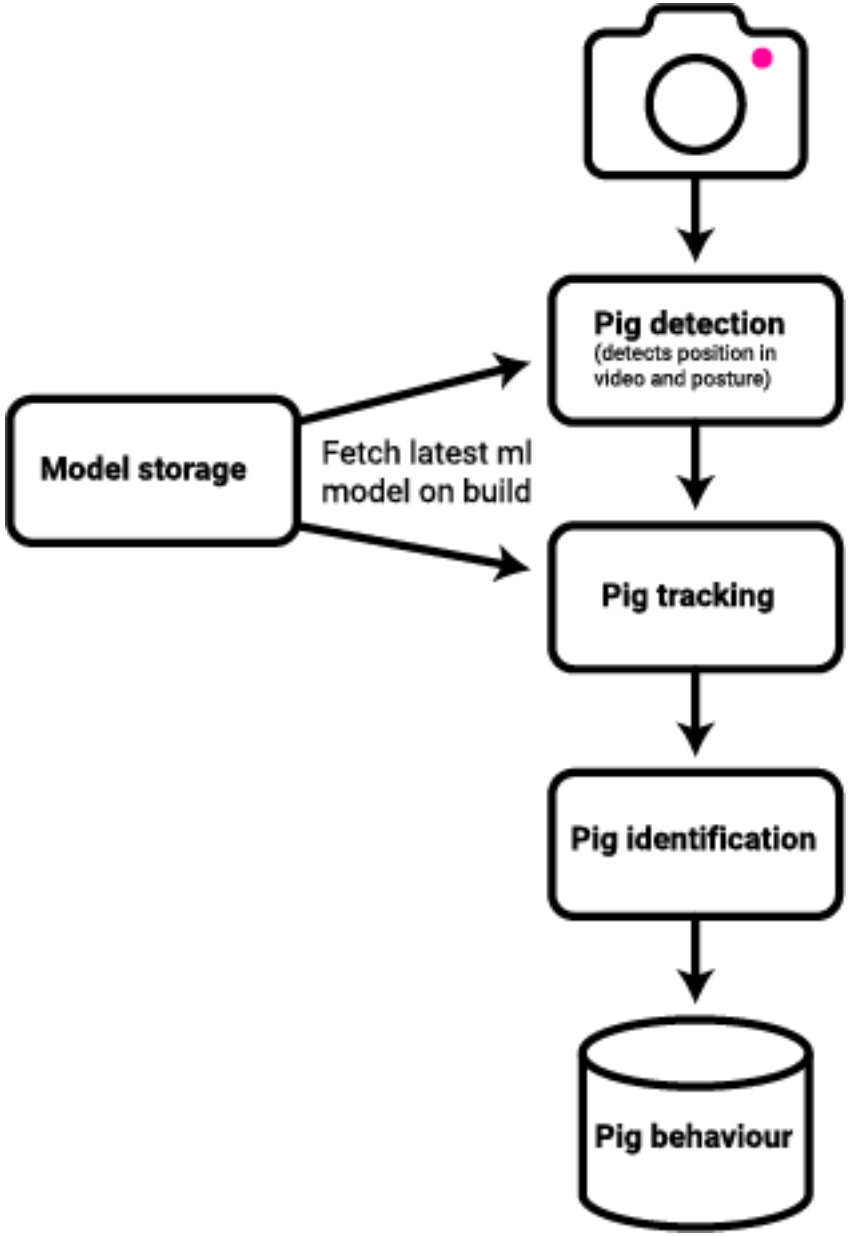
The pipeline



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The challenge

- Run **8 days** of video for **1200 animals**
- Run when there are **daylight** = **08:00 -> 20:59**
- Run **11345 hours** of video through our video pipeline (11 animals in one pen)

Initial code from researcher: detection

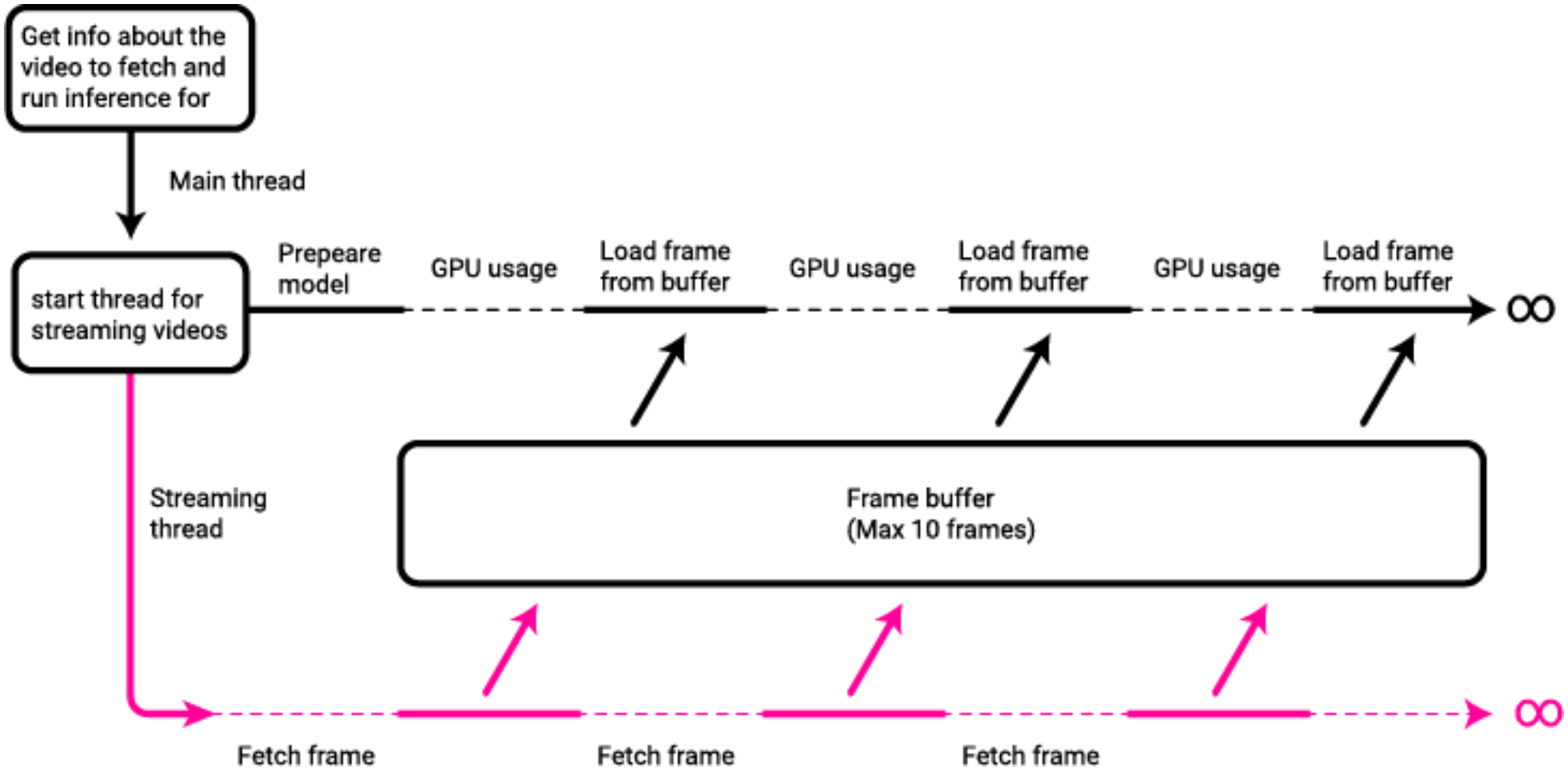
- Only **one video** can be started and run **at a time**.
- Processing a video takes approximately **1 hour** for a video that is **1 hour** long.

It will take **over 1.3 years** to run the original pipeline

Small changes

- **Gpu**
- Able to **select timeframe** to analyze videoes
- **Removed unnecessary code** used for analyze purposes

Threading



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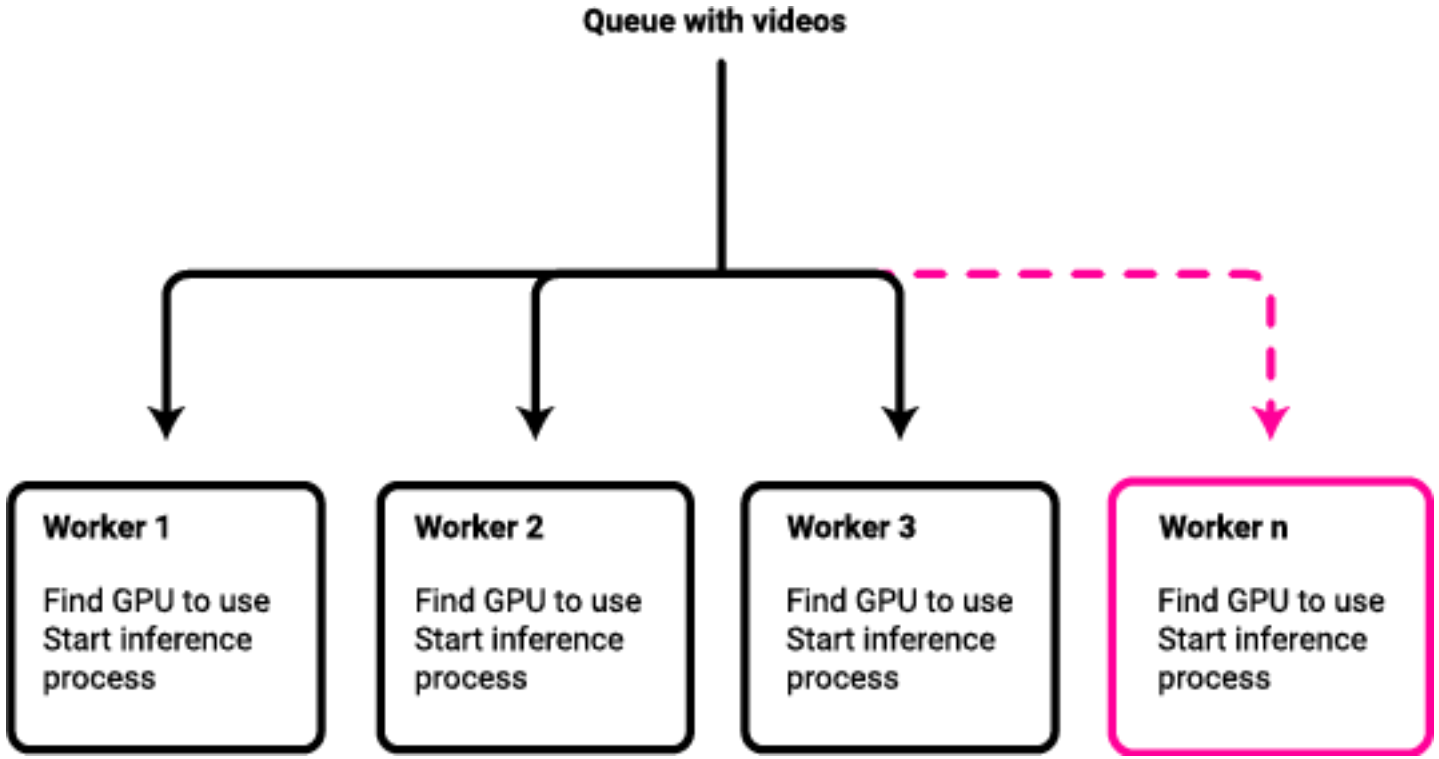
Multiprocessing

- Assign each worker to a shared GPU (several workers uses one GPU)
- Use a shared queue to feed video to available worker
- Balance CPU and GPU usage for optimal throughput



Video encoding

- H.265 (HEVC)
  - More complex algorithms, higher CPU/GPU usage
  - Produces **smaller file sizes** — about **34% smaller** than H.264 (0.66× the size).
- H.264 (AVC)
  - Simpler encoding, lower computational demand
  - Offers **much faster processing** — approximately **2.66× faster** than H.265 (166% faster).

- H.265 is more efficient in compressing video, making it ideal for high-resolution content and saving storage space. However, it requires more processing power and may not be supported on all devices. H.264, while less efficient, is faster and more broadly compatible, making it a reliable choice for many current applications.

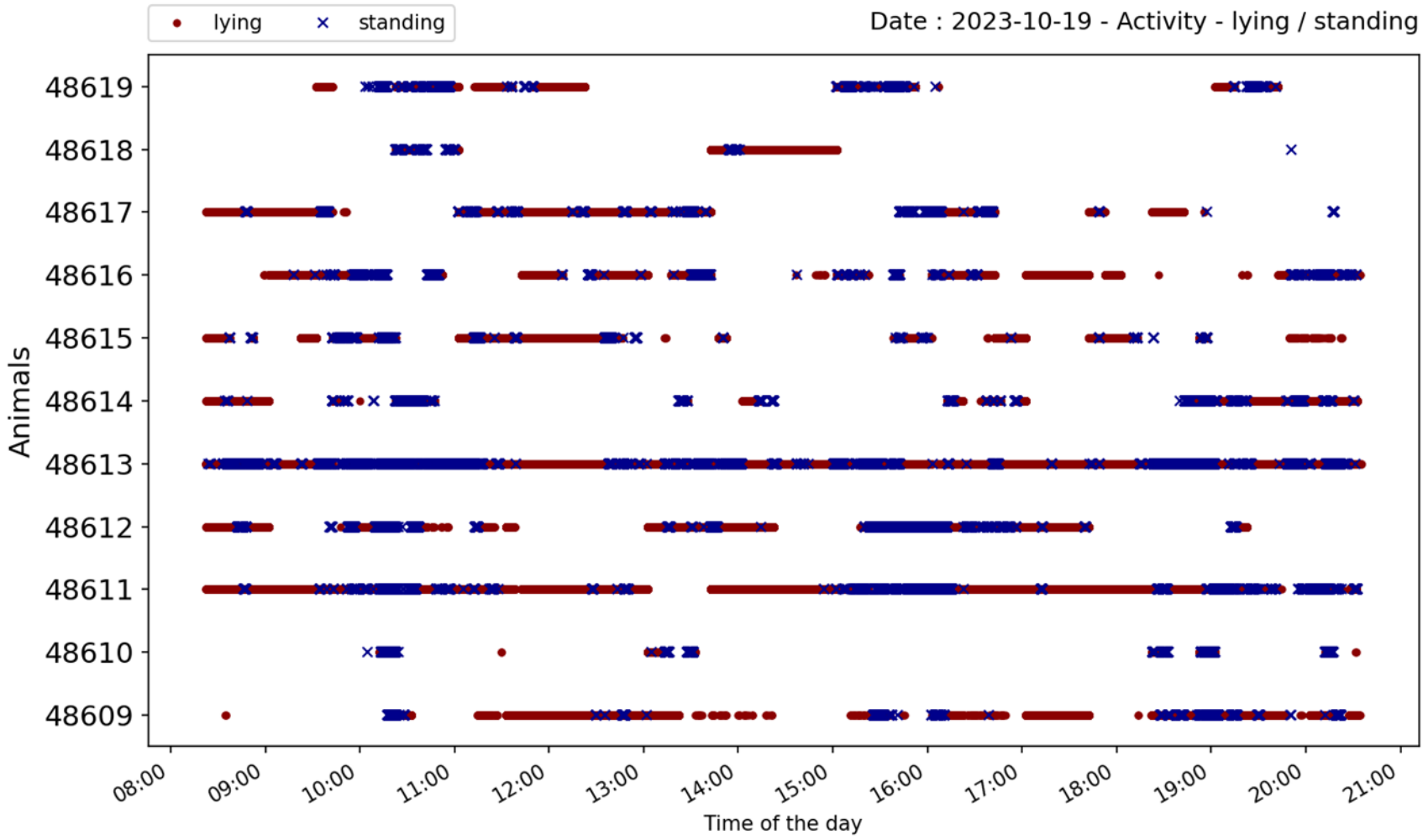
~40 seconds for one hour of video

Used the time to run n videos through detection divided on number of videos. Used a cpu with 32 kernels and 4 GPU's and fed 32 videoes through the pipeline. Average run time 1245 seconds for 32 videos. 1245/32=39s pr video

Time to run one week of video for one pen

- Detection: 1hour ~0.66 min per pen hour video
- Tracking: 14 hours ~5.00 min per pen hour video
- Identification: 10 minutes ~0.02 min per pen hour video

Result of tracking and identification



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Summarize

- Use **multithreading** if you have a lot of **i/o operations**
- Use **multiprocessing** if you have **processes** that can run **in parallell**
- Think about **encoding** used in videos
- **Optimize** your code
- And do not forget to use your **GPU(s)**

All illustrations in this presentation is made by Syverin Johansen