

# An ICT-based real-time advisory tool to minimise tail biting in fattening pigs



## Summary

### Algorithm optimization (WP2, KU Leuven)

- Five fundamental CV tasks are developed and validated on various housing conditions (Detect/Keypoint/Mask/Posture/Tracking)
- Feeding/Drinking behaviour monitoring are validated on large-scale video (3-months)
- Interactive behaviour monitoring are under validation

### Risk factors for tail biting(WP3, AU)

- Relations between feeding/drinking and tailbiting/lesions

### Evaluate the emerging tail-biting behaviour (WP4, Teagasc)

- Docked/Undocked
- With/without enrichment
- Standard management practices

## Main objective

- Tail biting is a major welfare, economical and ethical challenge faced during pig production
- To develop monitoring tool and establish relationship between risk factors and tailbite outbreak

## Achievements

- Tailored pig detection algorithm: mAP=0.97 (outperform the SOTA YOLOv5 by 32%)
- Keypoints/Mask/Posture algorithm: PCK=0.98, mIOU=0.95, posture accuracy = 0.93
- All CV algorithms are validated on 30+ farms, showing promising generalization capability
- Feeding duration monitoring on large scale video
- Interactive behaviour recognition are developed and under validation



Figure 1

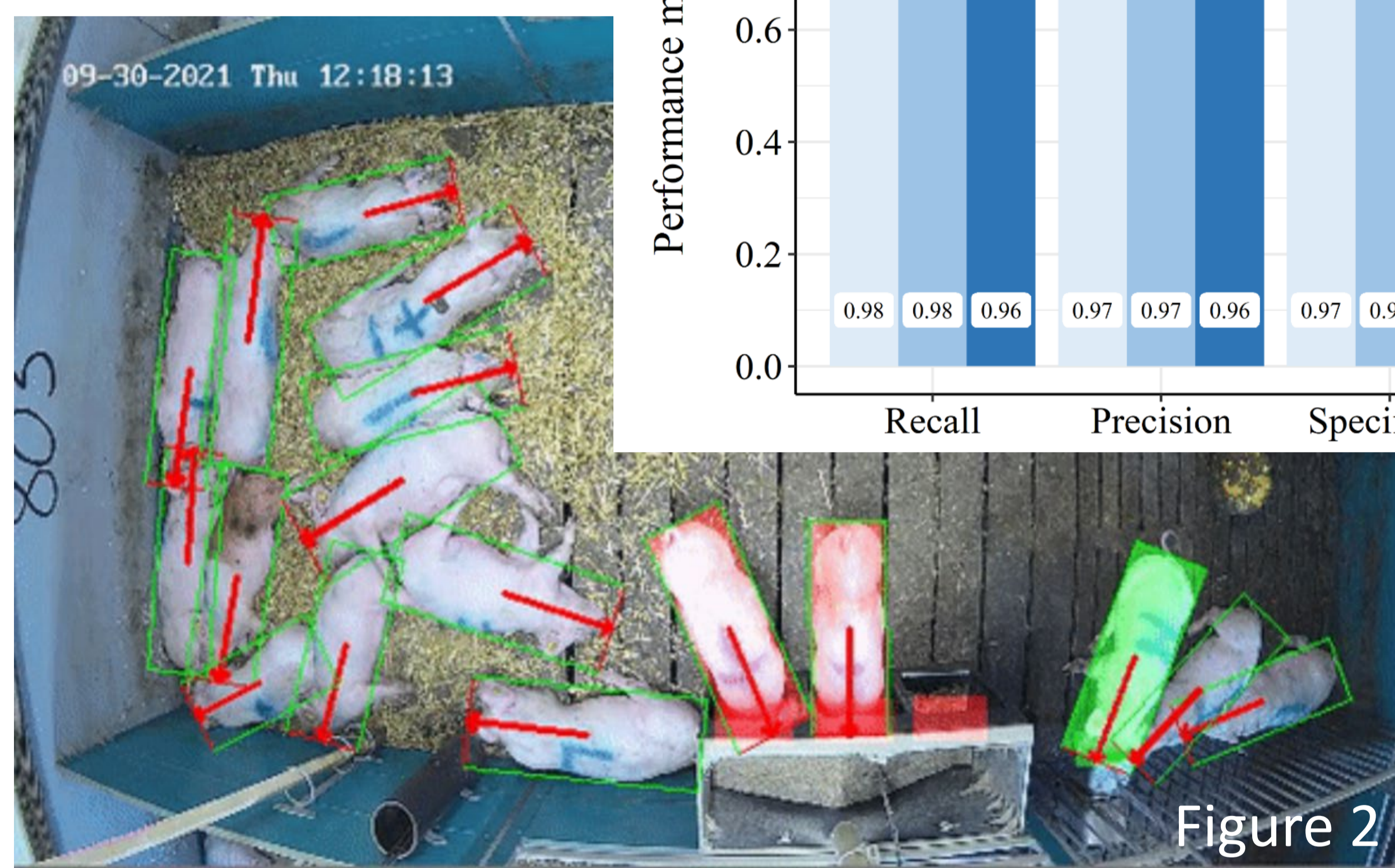
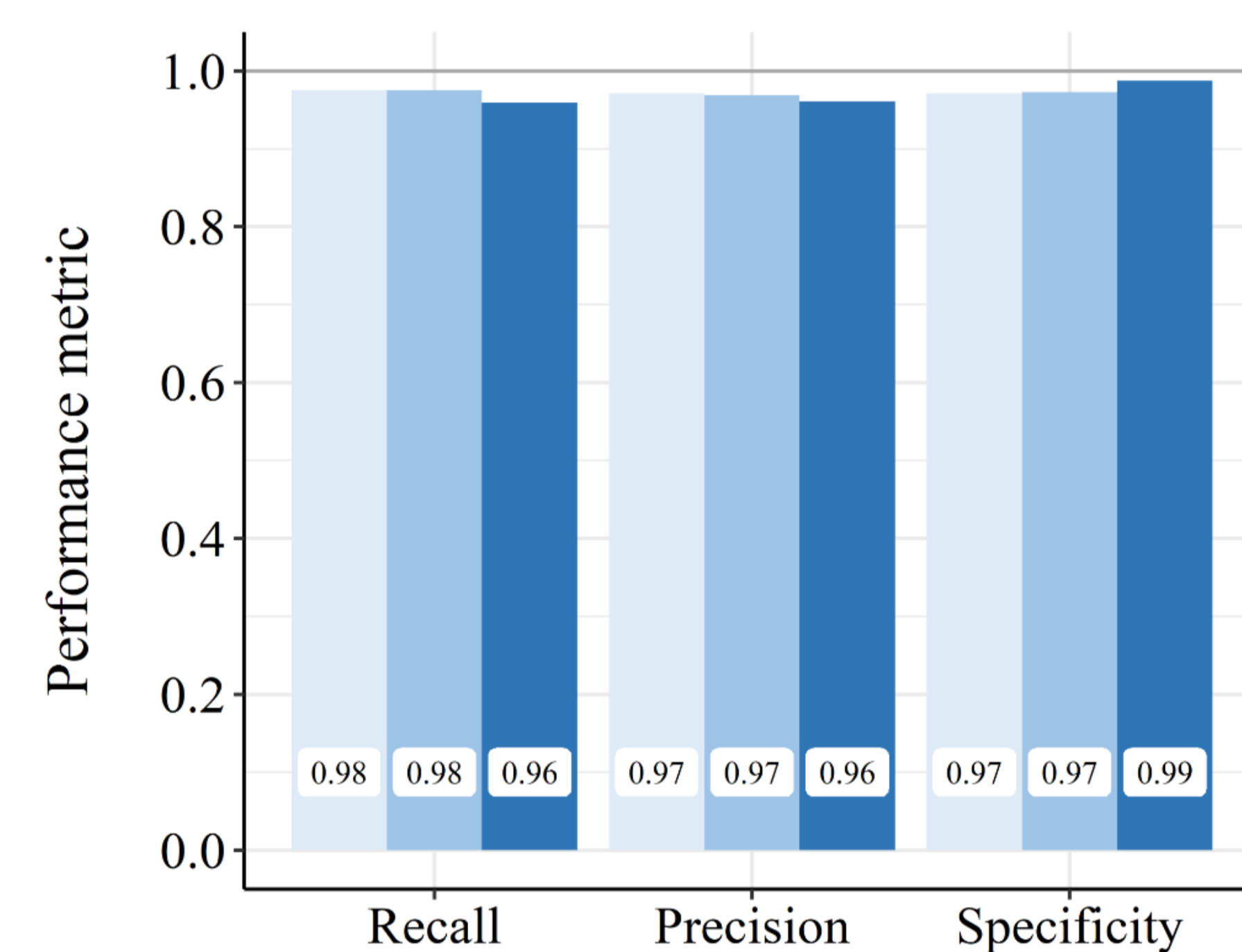


Figure 2

Fig. 1. Visualization of the proposed pig detection/tracking/keypoints/mask algorithms

Fig. 2. Visualization of drinking and feeding behaviour monitoring



## Preliminary conclusions/potential impact

- Challenge of monitoring pig behaviour in dense scenario was solved by our pig-tailored CV algorithms(Fig. 1)
- Behavioural monitoring by nose-to-tail, nose-to-feeder, nose-to-drinker and nose-to-enrichment interactions as indicators to detect tail biting, feeding, drinking and enrichment engagement.
- Feeding&Drinking example was demonstrated in Fig. 2.

## What's next?

- Evaluate the interactive behaviour algorithm on large-scale dataset
- Empower pig digital phenotype studies
- Build connections with pig industries and farmers, evaluate the ICT-tools in various scenarios

