Abnormal behavior analysis for surveillance in poultry farms

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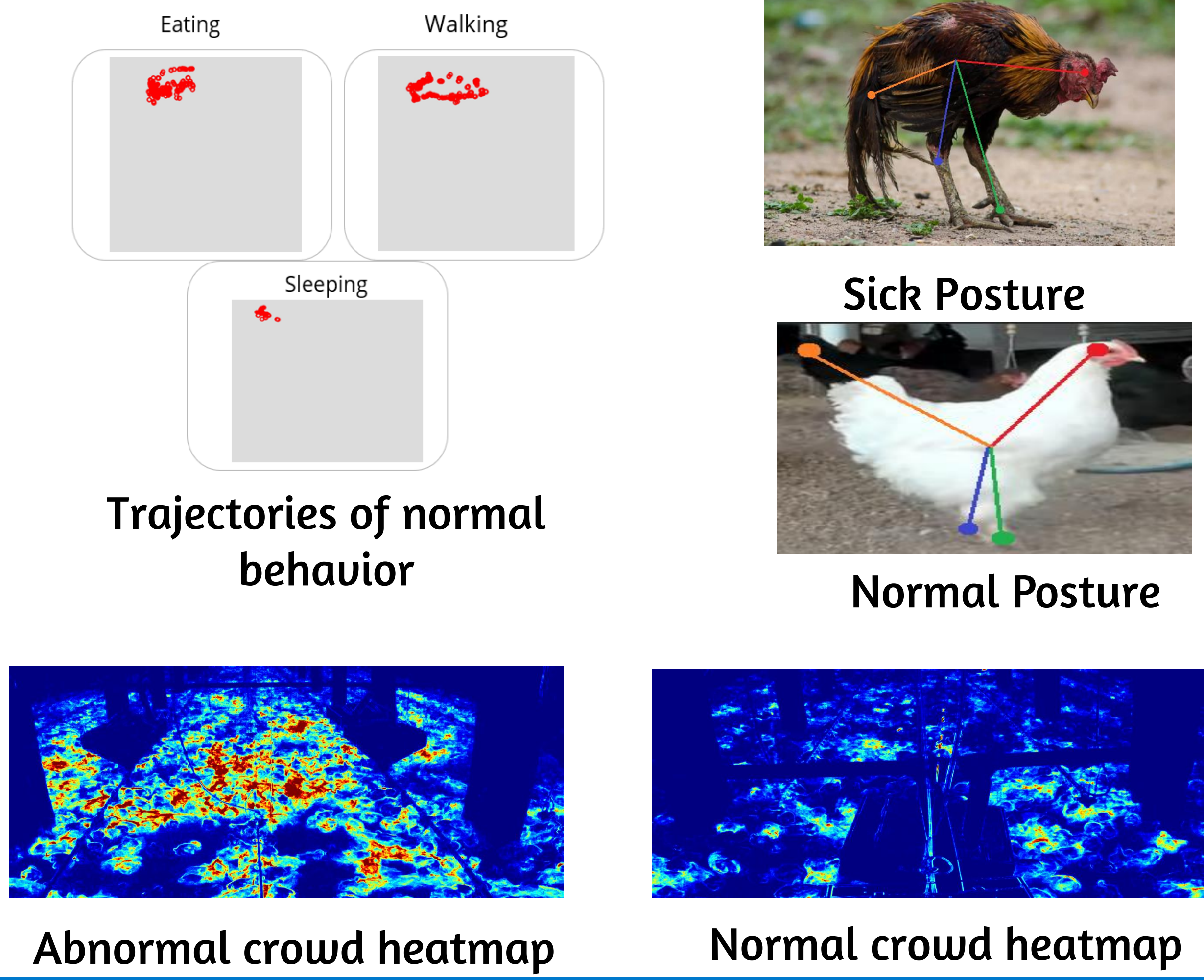
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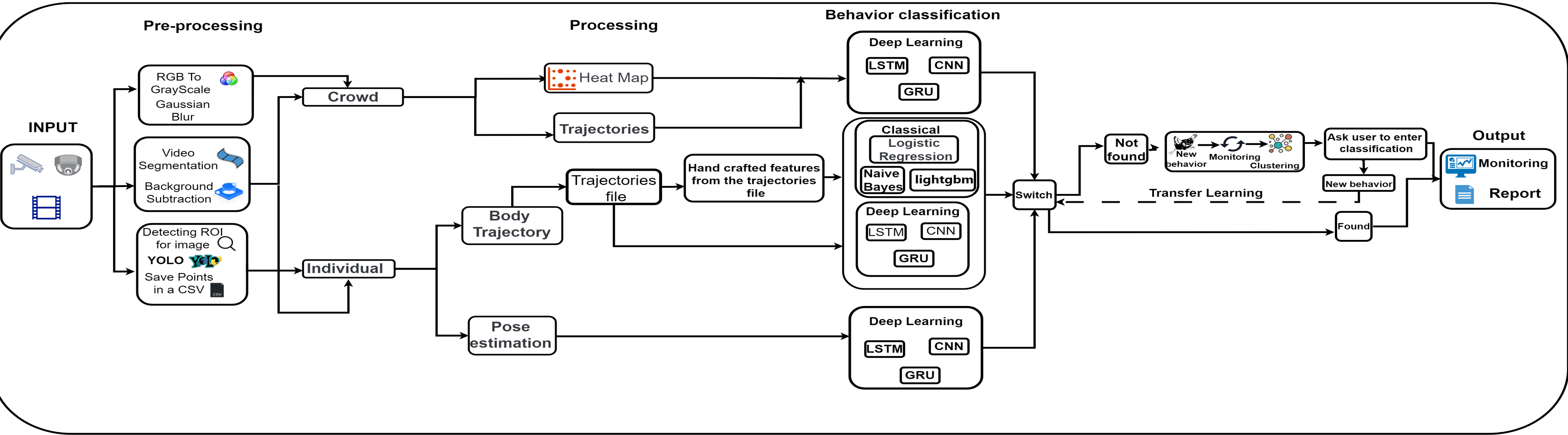Department of Computer Science

ABSTRACT

Poultry farming is an important industry that provides food for a growing population. However, the welfare of the birds is a major concern, as poor living conditions leads to abnormal behavior that affects the health and productivity of the flock. In order to monitor and improve the welfare of the birds, it is important to have a surveillance system in place that monitors the behavior of the chickens and alert farmers to potential issues. We present a computer-vision-based system that detects and monitors the behaviors of the chickens in poultry farms

Trajectories of normal behavior

Sick Posture

Normal Posture

Abnormal crowd heatmap

Normal crowd heatmap

SYSTEM OVERVIEW

DATASET

The dataset was gathered from video footage sourced from both YouTube and Dakahlia

Dakahlia GROUP

- Dakahlia Farms dataset consists of 3 hours of videos.
- 3 classes (eating, sleeping, abnormal) accurately labelled by professionals.

- Youtube videos sum to 6 hours of videos
- 3 classes namely walking, eating, and sleeping.

Aim of the work

- Minimize mortality of chickens
- Detect any abnormal behaviors of chickens and detect the diseases.

USED TOOLS

python
Keras
PyCaret
YOLO
OpenCV

METHODOLOGY

The system proposed consists of six stages: pre-processing, background subtraction and ROI detection, chicken filtering, trajectory extraction, behavior classification, and output as shown in the following Figure.

(A)   (B) Background Subtraction   (C) ROI   (D) Filtering Chicken Detection — Yolov7

(F) Trajectory points extraction   (E)
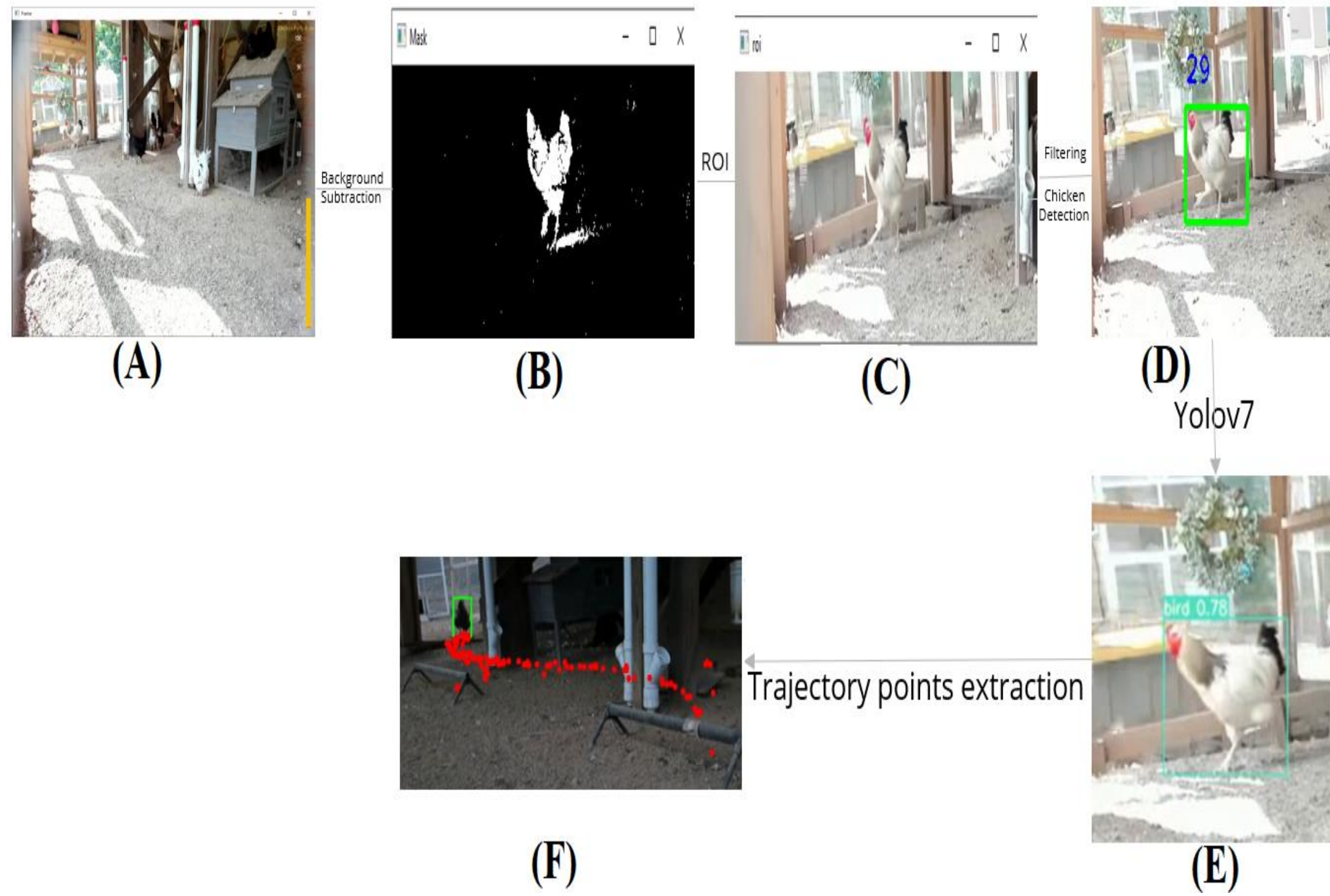
- Pre-processing: video segmentation, background subtraction
- YOLO and Kalman filter for chicken filtering and ID assigning
- Trajectory extraction every 10 frames
- Handcrafted features were calculated such as mean, median, distance covered, etc.

Background Subtraction

Heat Map   Trajectory
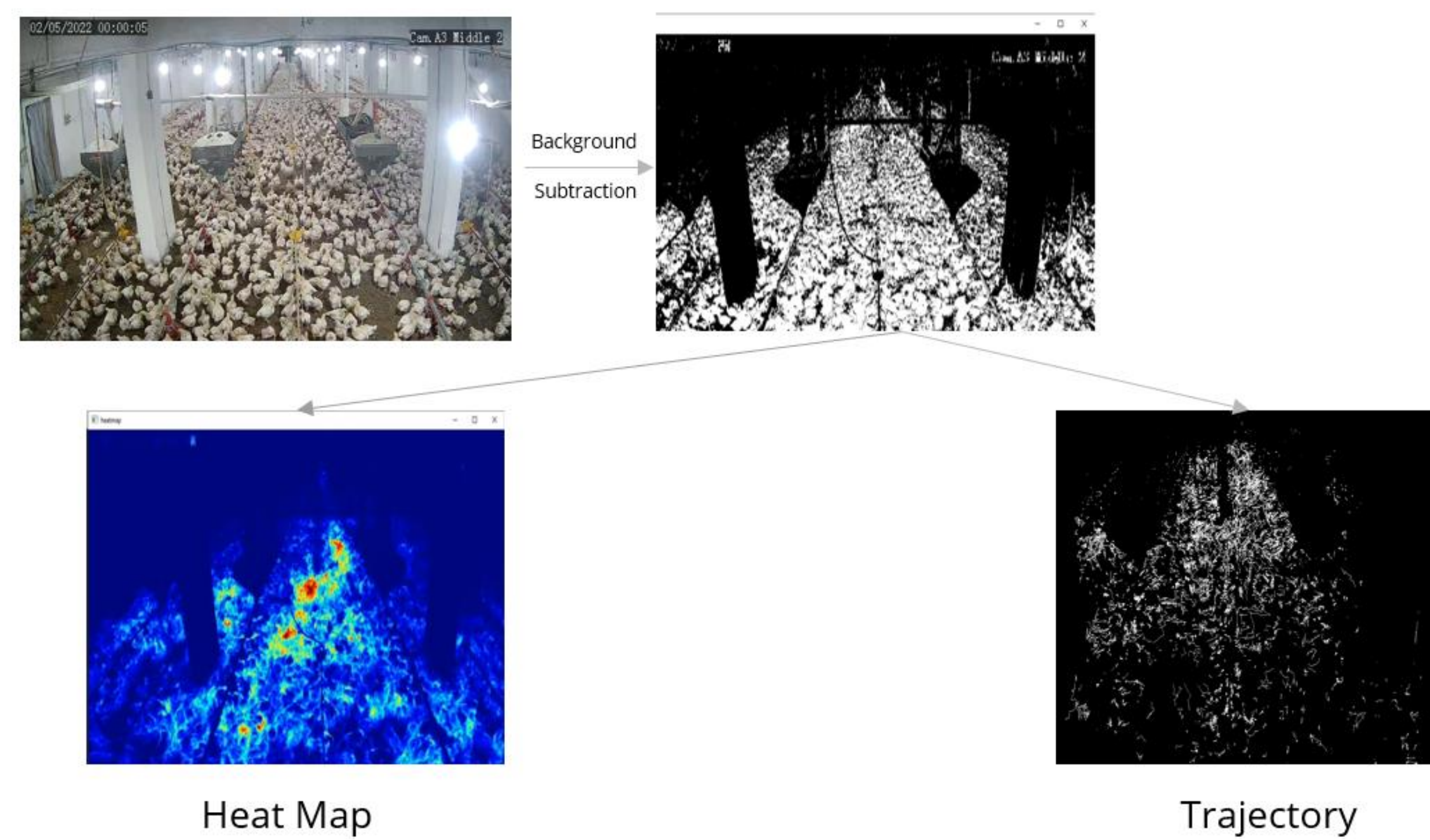
RESULTS

| Model	Accuracy	AUC	Recall	Prec.	F1	Kappa	MCC
Light Gradient Boosting Machine	0.9444	0.9676	0	0	0	0.9167	0.9209

The model scored 94.44% in detecting chicken behaviors (walking, eating, and sleeping).
Data-set size: 90 records split evenly.
Data-set split: 80-20 split between training and testing respectively.
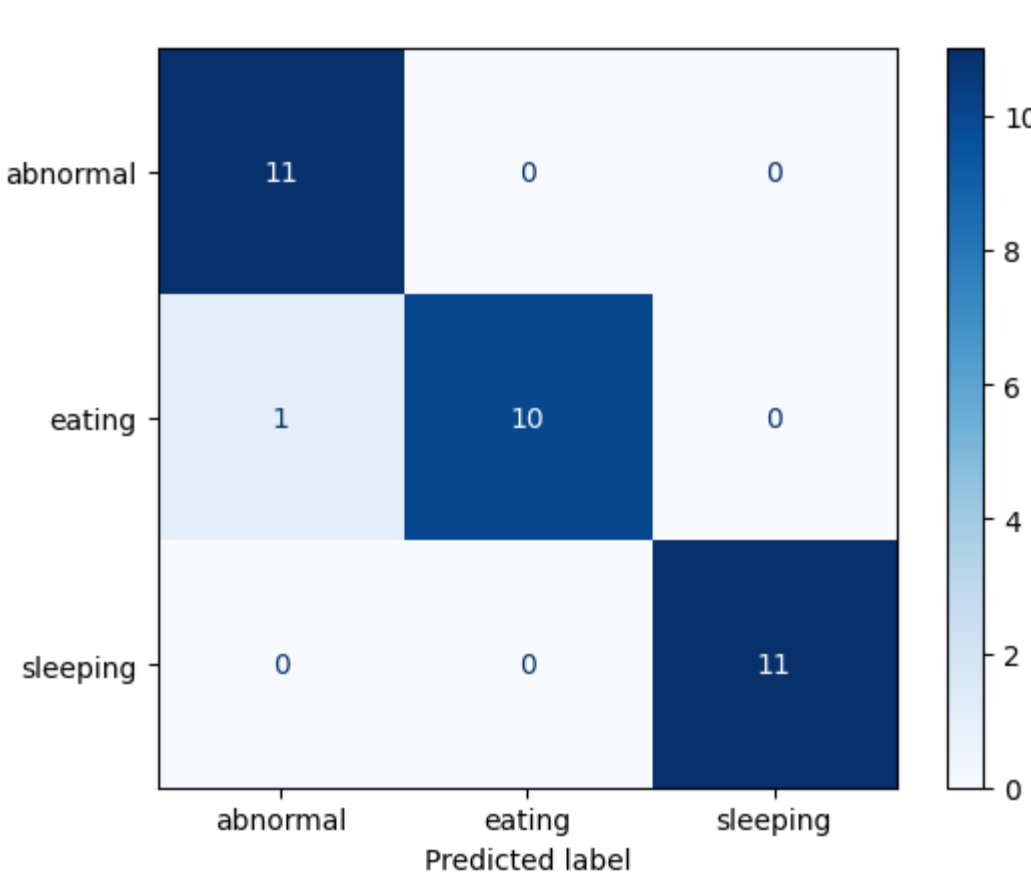

	Model	Accuracy	AUC	Recall	Prec.	F1	Kappa	MCC
0	Logistic Regression	0.9848	0.9985	0	0	0	0.9798	0.9801

- 98.8% accuracy on a bench-marked HAR data-set.
- 4 classes: standing still, walking, jumping, running.
- Data-set size: 270 record split evenly.
- Data-set split: 80-20 between training and testing, respectively.
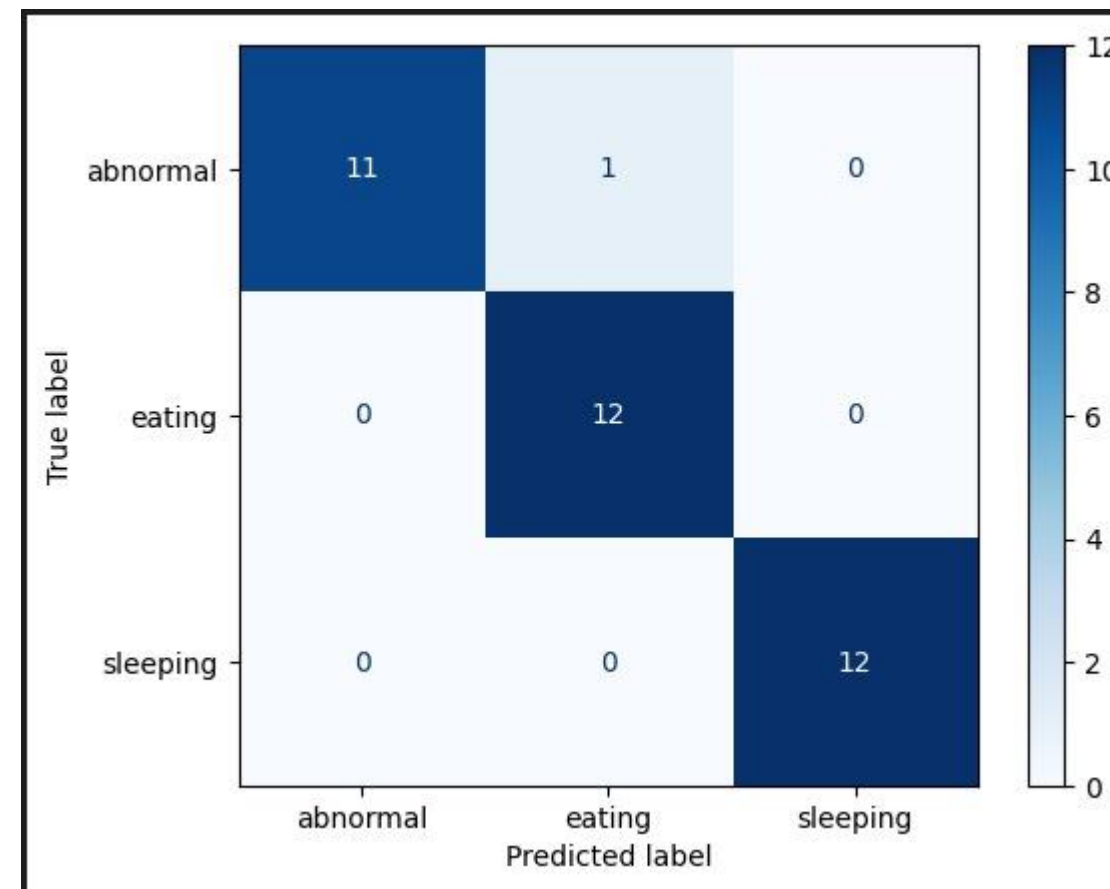
Heat Map   Trajectory Map

Demos, and presentation.

PUBLISHING

The paper has been published in the International Journal of Advanced Computer Science and Applications (IJACSA) March 2023 Edition (Volume 14 No 3).

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