

CHICKENME: CLASSIFICATION OF CHICKEN DISEASES FROM FECAL IMAGES

PROPOSAL PRESENTATION 2023

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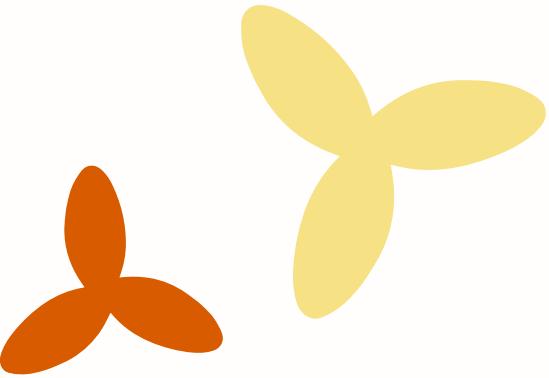


ABOUT CHICKENME

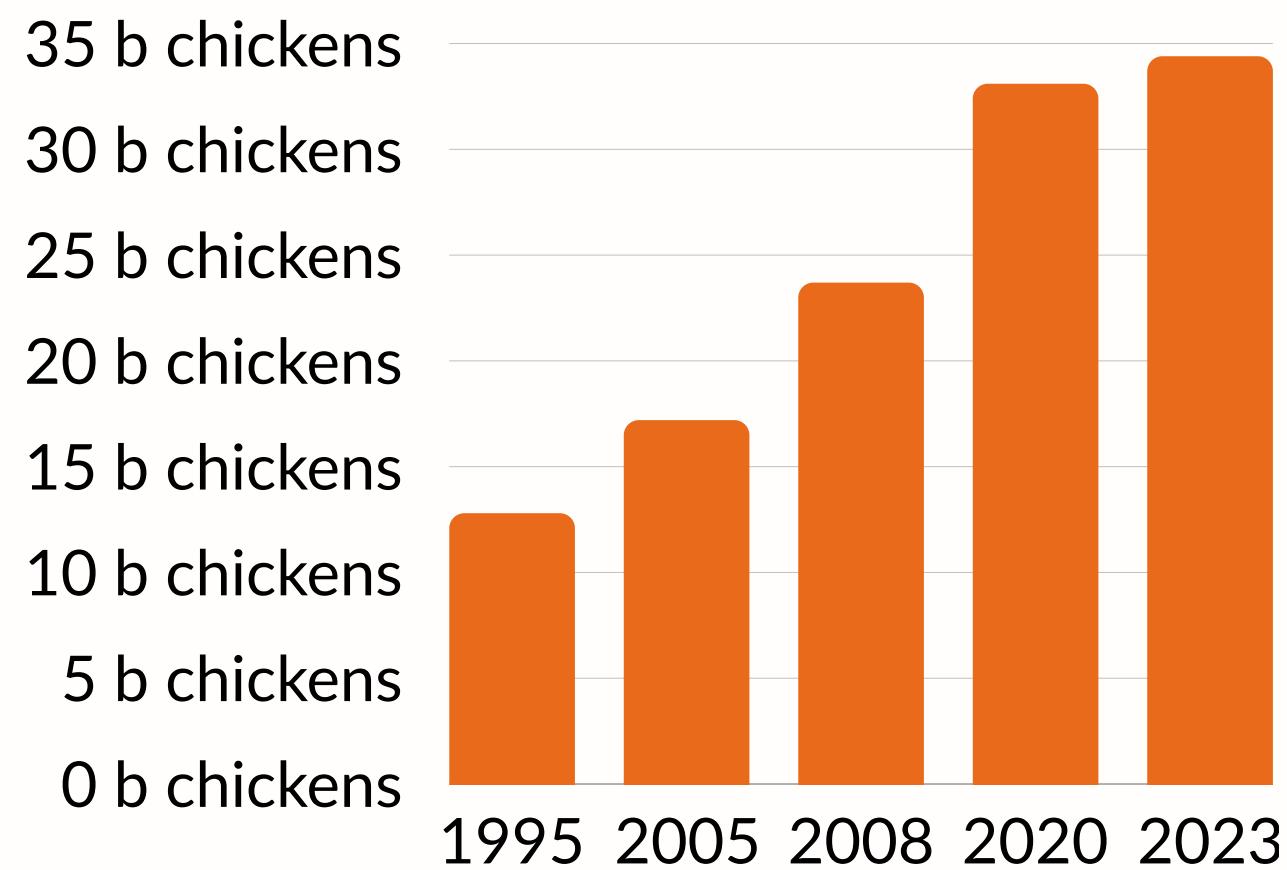
Smart-farming technology for classification Of
Chicken Diseases From Fecal Images

- **ChickenME** is an automated disease classification, by detect and predict of health condition in chickens such as **Coccidiosis, Salmonella, NCD, and Healthy**.
- **ChickenME's** system is designed to detect disease through images of chicken droppings.
- Implementation of **Object Detection** and **Deep Learning** within **LINE OA**

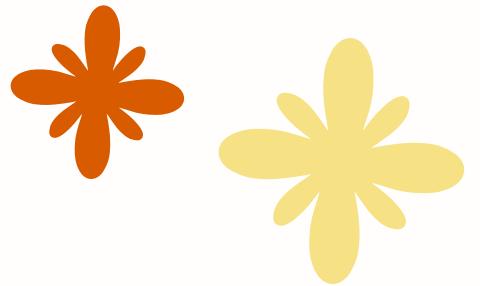




PROBLEM STATEMENTS



- Approximately 34.4 billion chickens worldwide in 2023
- There are many levels of standards for chicken livestocks
 - The increase in the chicken population increases the risk of infectious diseases; **an increasing in poultry mortality rates and economic losses.**
 - Some diseases require high epidemic control; **high severity of the disease**
 - Disease confirmation using **PCR can be costly.**
 - Diagnose disease through observation and experience; **Time-consuming and inherently vulnerable to errors**

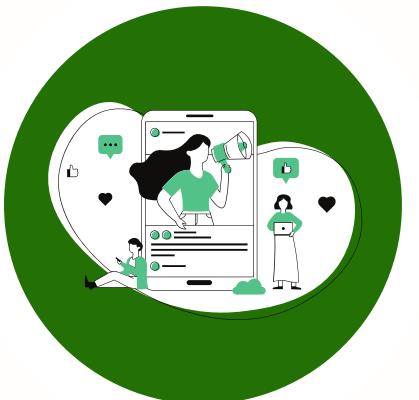


PROJECT OBJECTIVES



AUTOMATED DISEASE DETECTION

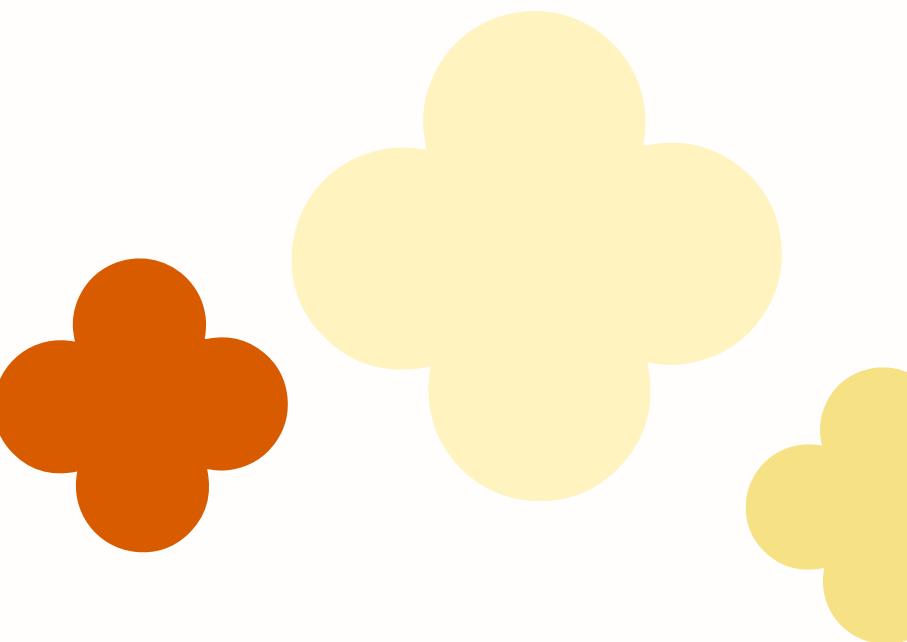
- leverage Deep Learning to rapidly and accurately detect diseases from chicken dropping images.
- Rapid and precise disease detection from chicken fecal images.

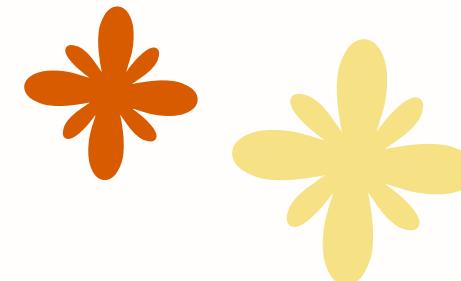


DELIVER RESULT VIA THE LINE OA

- Implement deep learning within the Line OA
- User-friendly accessibility
- Time-saving experience

BACKGROUND & LITERATURE REVIEW





EPIDEMIOLOGY AND DISEASE MANAGEMENT IN POULTRY



OVERVIEW OF EPIDEMIOLOGY IN POULTRY

- Monitoring and control of diseases.



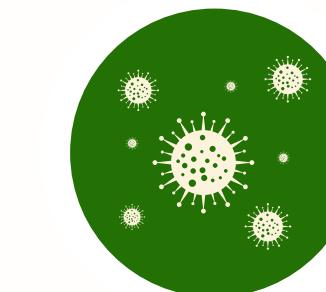
EPIDEMIOLOGISTS' ROLE

- understand disease trends, risk factors, and economic impacts.
- Patterns of disease, prevention strategies, and economic implications in the poultry industry.



PREVENTIVE MEASURES

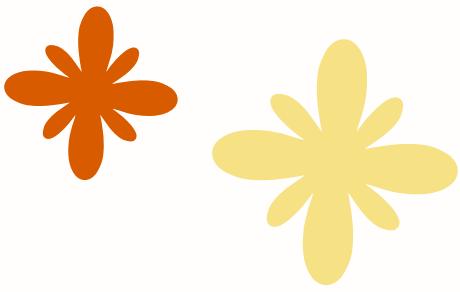
- Implementation of strict biosecurity measures to prevent transmission.
- Design and administration of effective vaccination programs.



COMMON POULTRY DISEASES

- Illness from various bacterial, viral and parasitic pathogens.
- Impact: mortality, economy

POULTRY DISEASES AND HEALTHY DROPPINGS CHARACTERISTICS



HEALTHY

- Well-formed, solid
- various shades of brown.



COCCIDIOSIS

- Dark brown, flat feces,
- Diarrhea with blood or mucus.



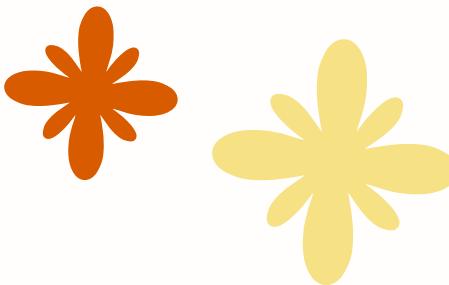
**NEWCASTLE DISEASE
(NCD)**

- Solid green feces



SALMONELLA

- White, loosely shaped



RELATED WORK



DATASET

Machine Learning Dataset for Poultry Diseases Diagnostics

Machuve, Dina¹ ; Nwankwo, Ezinne²; Mduma, Neema¹ ; Mbelwa, Hope¹; Maguo, Evarist³; Munisi, Charles³

[Hide affiliations](#)

- 1. Nelson Mandela African Institution of Science and Technology
- 2. Duke University
- 3. Elang'ata Agrovet Services

The annotated dataset of poultry disease diagnostics for small to medium-scale poultry farmers consists of poultry fecal images. The poultry fecal images were taken in Arusha and Kilimanjaro regions in Tanzania between September 2020 and February 2021 using Open Data Kit (ODK) app on mobile phones. The typical normal fecal material which is the 'healthy' class and Coccidiosis disease, the 'cocco' class were taken from poultry farms. The chickens were inoculated for Salmonella disease and fecal images taken from the diseased chickens for the 'salmo' class after one week. The chickens were also inoculated for Newcastle disease and fecal images for the 'ncd' class were taken within three days.



ALGORITHMS



Contents lists available at [ScienceDirect](#)

Smart Agricultural Technology

journal homepage: www.journals.elsevier.com/smart-agricultural-technology

Smartphone based detection and classification of poultry diseases from chicken fecal images using deep learning techniques

Mizanu Zelalem Degu ^{a,c,*}, Gizeaddis Lamesgin Simegn ^{b,c}

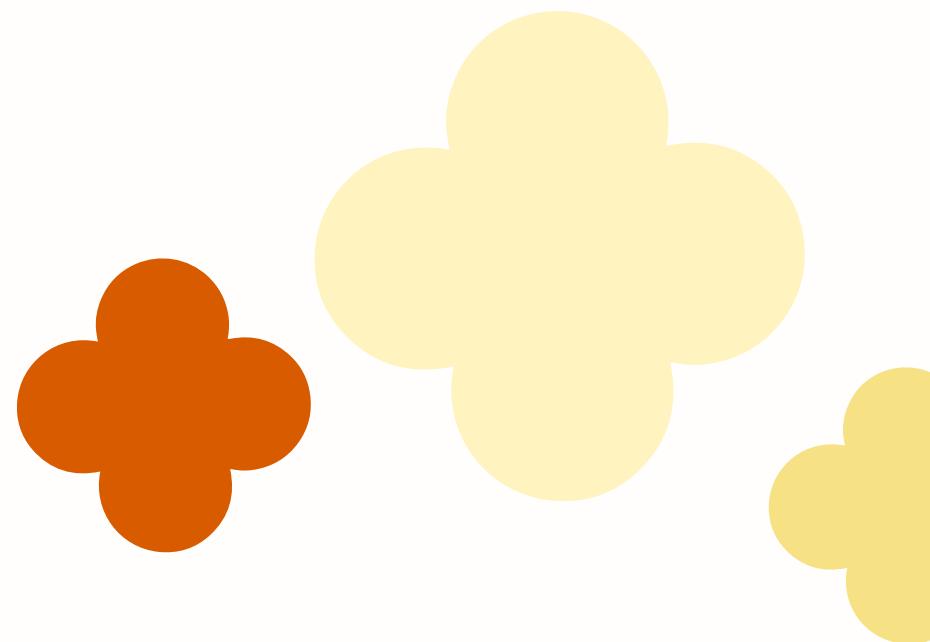
^a Lecturer of Faculty of Computing and Informatics, Jimma Institute of Technology, Jimma, Ethiopia

^b Associate professor of School of Biomedical Engineering, Jimma Institute of Technology, Jimma, Ethiopia

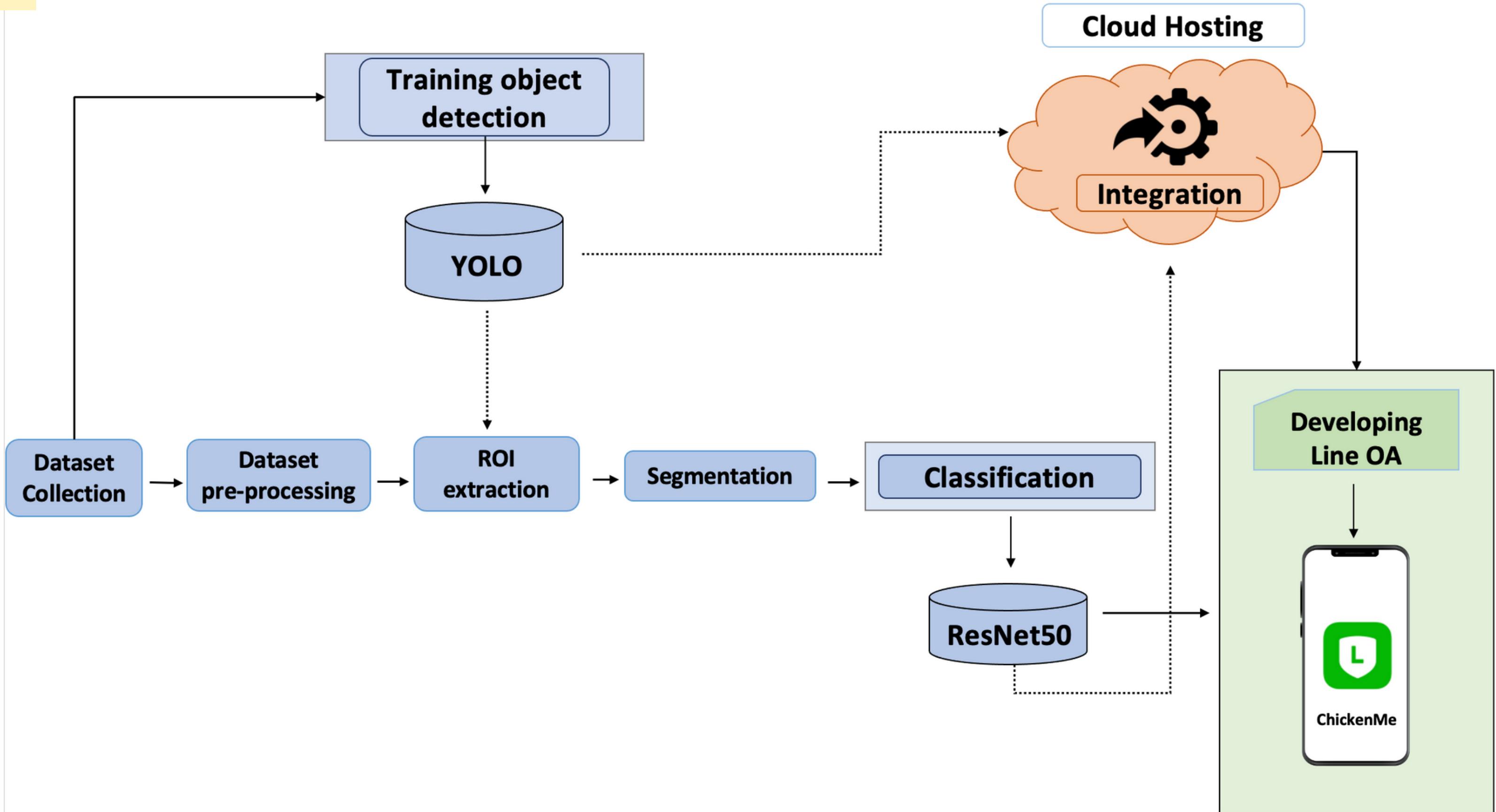
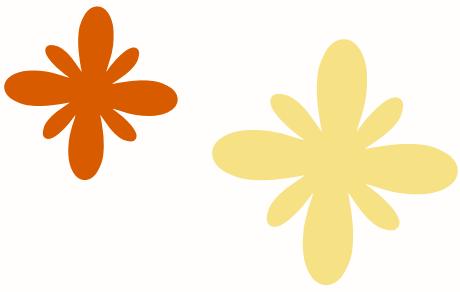
^c AI and Biomedical Imaging Research Unit, Jimma Institute of Technology, Jimma, Ethiopia



PRELIMINARY / PROGRESS



SYSTEM OVERVIEW

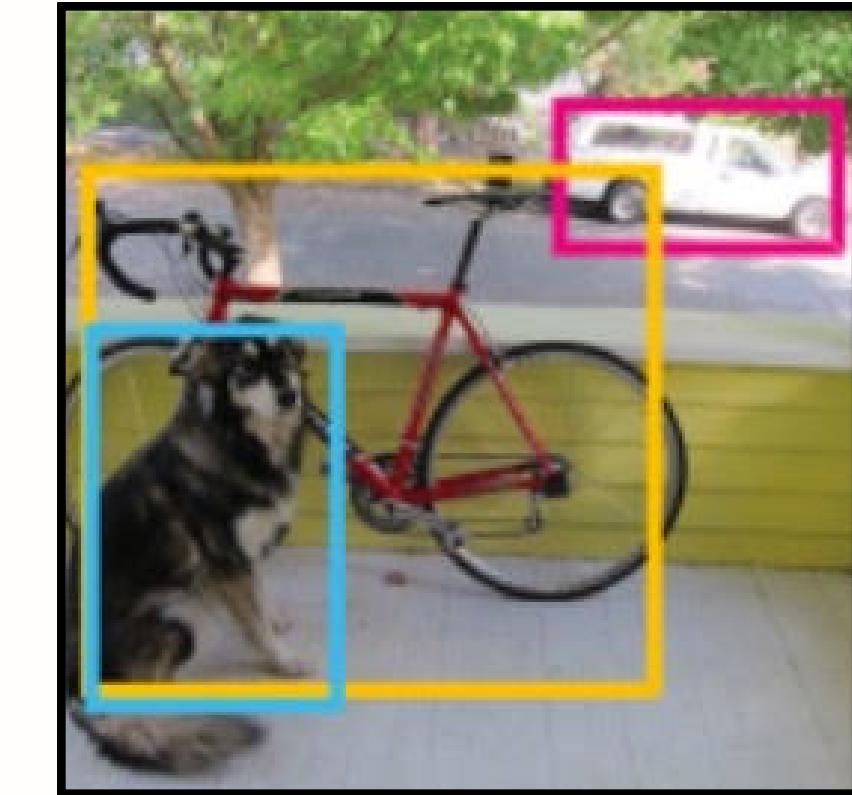


OBJECT DETECTION / ROI EXTRACTION

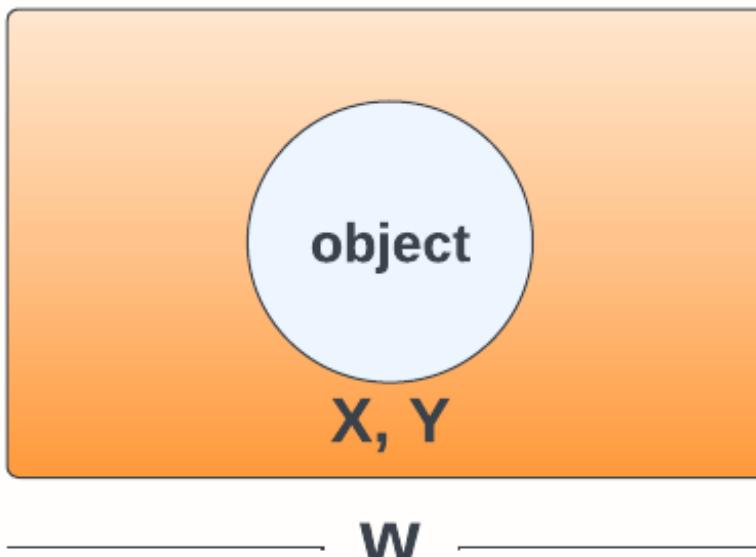


OBJECT DETECTION

- Detect and locate instances of objects in images or videos.
- Determining the position and boundaries of objects within an image.
- Complementing image classification and retrieval processes.

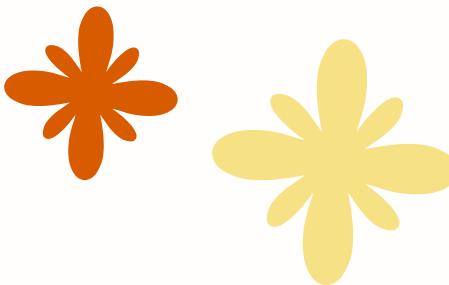


ROI EXTRACTION



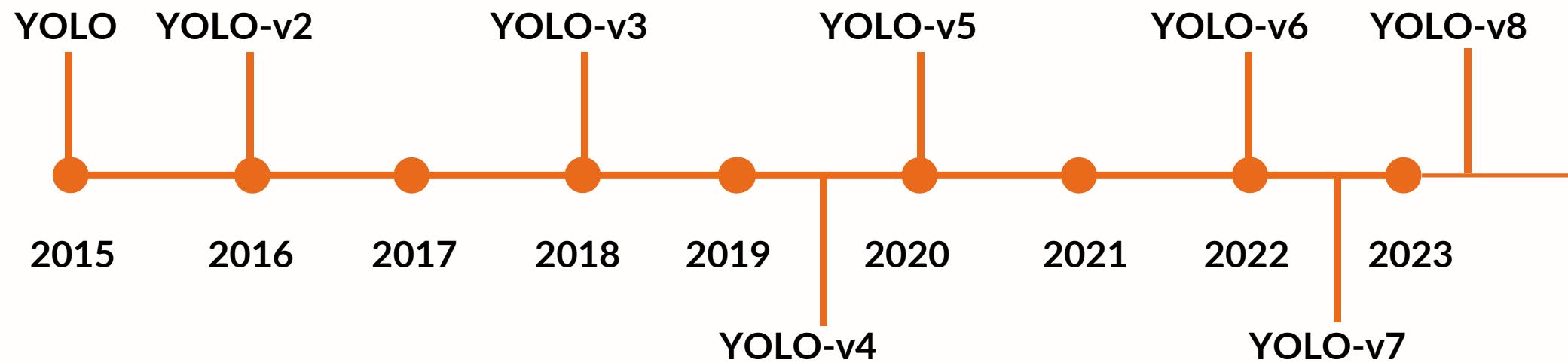
REGION OF INTEREST (ROI) EXTRACTION

- To identifies and isolates specific areas within an image.
- To avoid the processing of irrevelent image points and accelerate the processing.
- Involves segmentation to divide the image into useful segments.

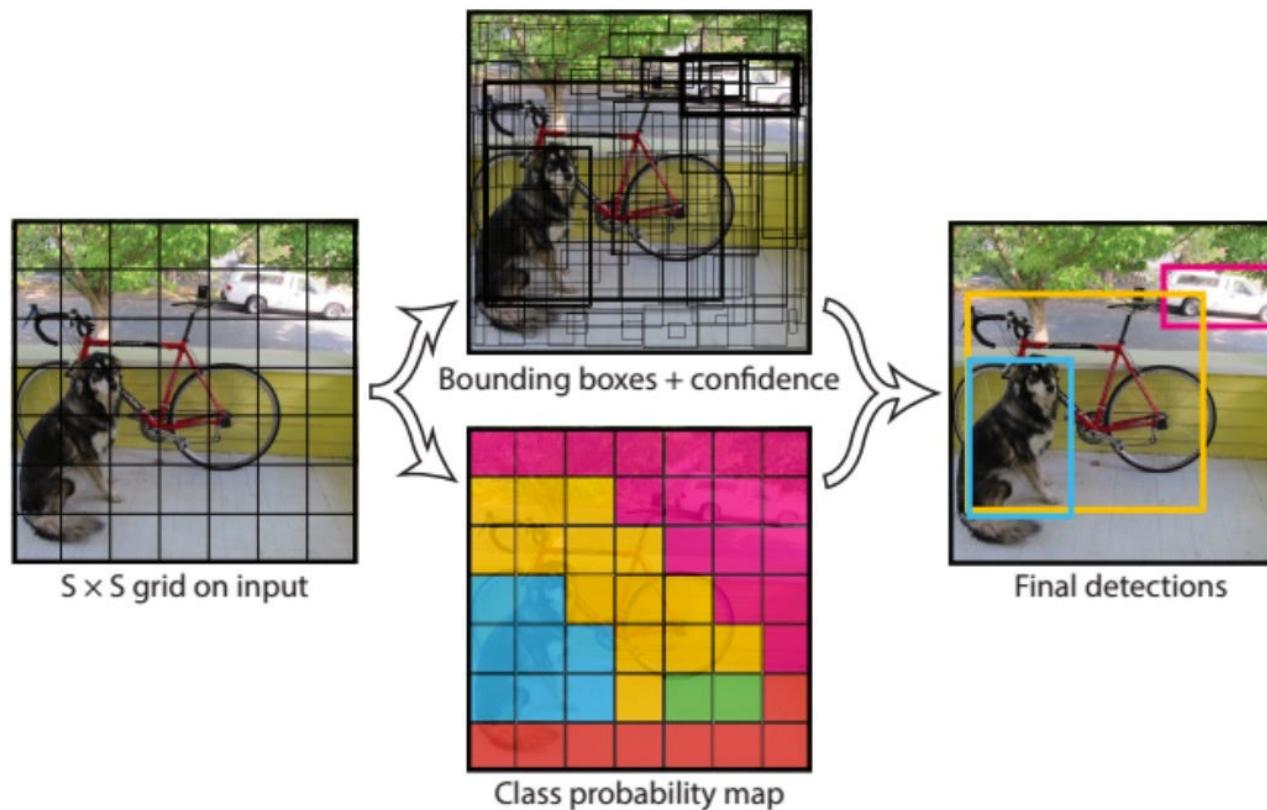


YOLO (YOU ONLY LOOK ONCE)

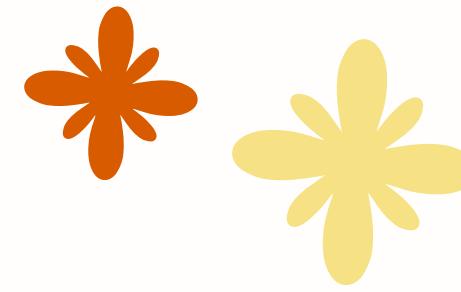
- The high ability to execute real-time object detection tasks.
- Rooted in deep learning principles, leveraging Convolutional Neural Networks (CNNs) for the detection and classification of objects in images.



YOLO ALGORITHM



- The image is divided into grid cells. Each grid cell forecasts B bounding boxes and provides their confidence scores. The cells predict the class probabilities to establish the class of each object.



DARKNET FRAMEWORK AND DARKNET53

DARKNET FRAMEWORK

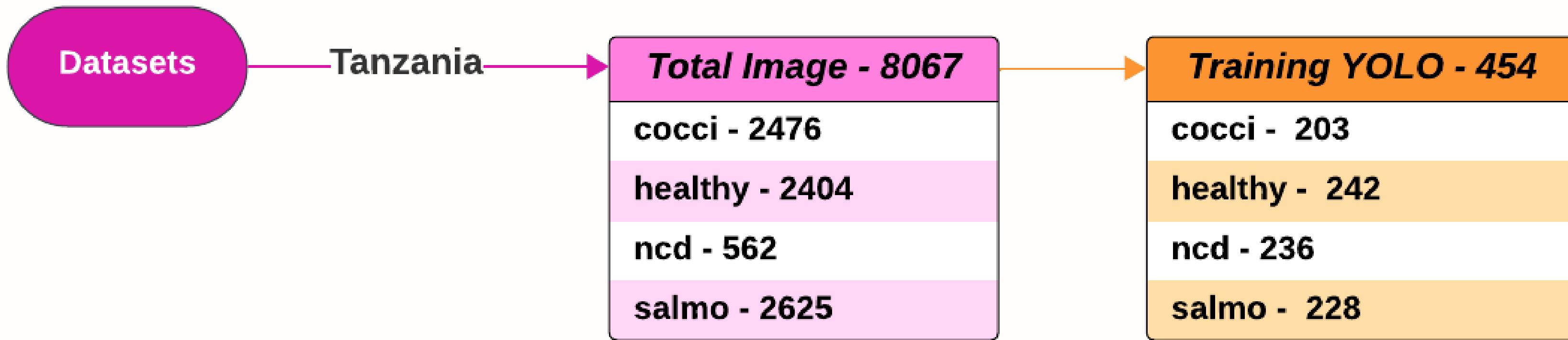
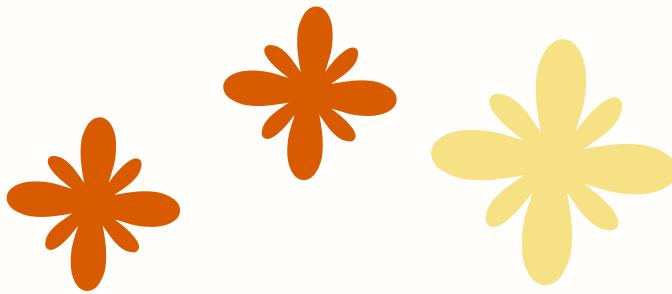
- **Purpose:** Specially designed for training neural networks.
- **Known for:** Association with the YOLO series for real-time object detection.
- **Features:** Renowned for its simplicity and efficiency.

DARKNET53 ARCHITECTURE

- **Structure:** Consists of 53 layers.
- **Role:** Acts as the backbone or feature extractor in YOLOv3.
- **Attributes:** Lightweight and fast.
- **Usage:** Commonly pre-trained on ImageNet; used as a base for various visual tasks.

Type	Filters	Size	Output
Convolutional	32	3×3	256×256
Convolutional	64	$3 \times 3 / 2$	128×128
1x Convolutional	32	1×1	
1x Convolutional	64	3×3	
Residual			128×128
Convolutional	128	$3 \times 3 / 2$	64×64
2x Convolutional	64	1×1	
2x Convolutional	128	3×3	
Residual			64×64
Convolutional	256	$3 \times 3 / 2$	32×32
Convolutional	128	1×1	
8x Convolutional	256	3×3	
Residual			32×32
Convolutional	512	$3 \times 3 / 2$	16×16
Convolutional	256	1×1	
8x Convolutional	512	3×3	
Residual			16×16
Convolutional	1024	$3 \times 3 / 2$	8×8
Convolutional	512	1×1	
4x Convolutional	1024	3×3	
Residual			8×8
Avgpool			Global
Connected			1000
Softmax			

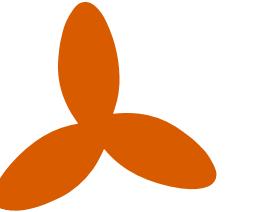
DATASET



BOUNDING BOX



YOLO MODEL OUTPUT





YOLO MODEL TRAINING SUMMARY

```
class_id = 0, name = ROI, ap = 76.31% (TP = 77, FP = 21)
```

IoU threshold = 50 %, used Area-Under-Curve for each unique Recall
mean average precision (mAP@0.50) = 0.763107, or 76.31 %

MEAN AVERAGE PRECISION = 76.31%

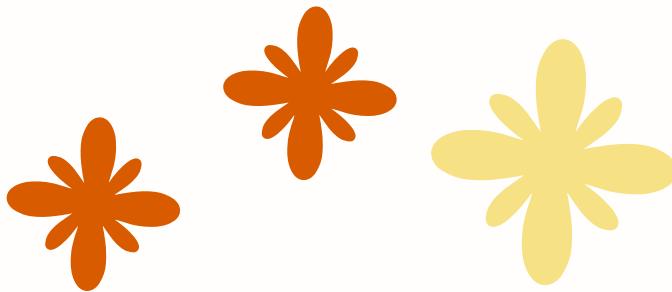


IMAGE CLASSIFICATION



CONCEPT

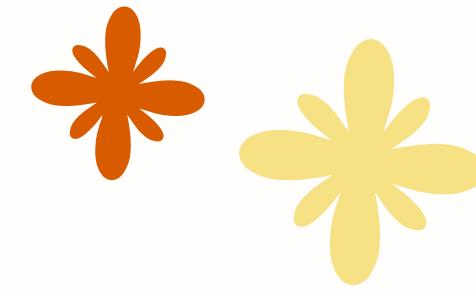
- involves classify an image into predefined classes or labels.
- Categorize an input image by assigning it a specific label or class based on its content.



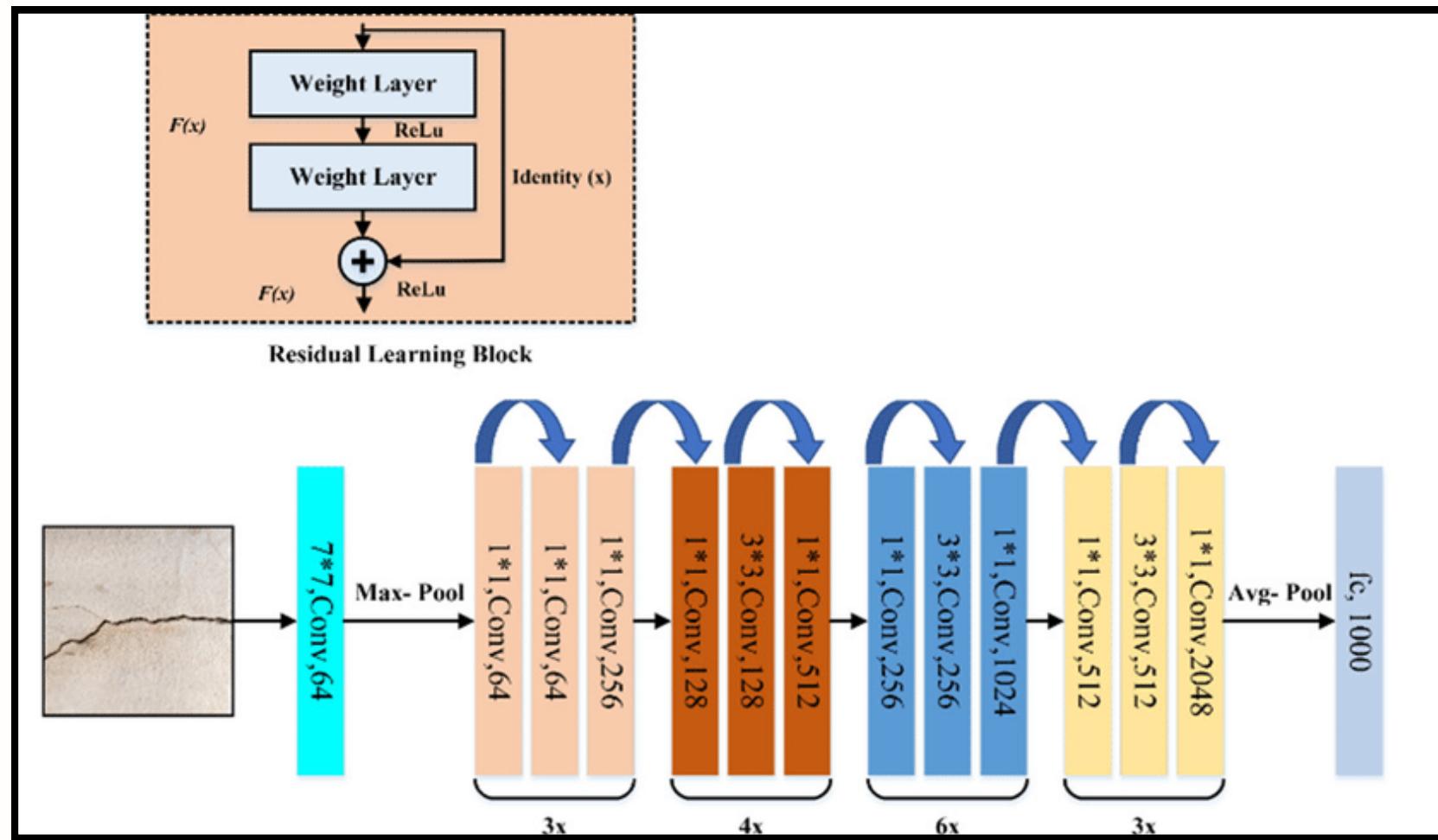
PROCESS

- Training a Model on a labeled dataset.
- Learns patterns and features that relate to each class.





RESNET50 MODEL FOR IMAGE CLASSIFICATION

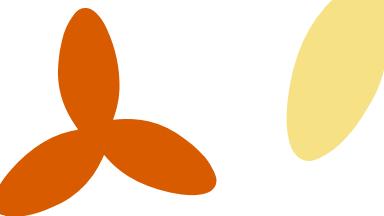


OVERVIEW OF RESNET50

- A deep convolutional neural network with 50 layers.
- Designed for efficient training of deep networks.
- Widely used in various domains including facial recognition and autonomous vehicles.

KEY FEATURES OF RESNET50

- **Architecture:** Comprises 5 stages with convolutional and identity blocks, batch normalization, and ReLU activations.
- **Skip Connections:** Help bypass layers during forward pass to alleviate the vanishing gradient problem.
- **Residual Learning:** Focuses on learning the residual differences between input and output.



LINE OFFICIAL ACCOUNT

We chose to use **LINE OA** because it is an easily accessible application. Thai people still use it to communicate in various ways, making it convenient for the general public.

สวัสดี คุณ Tai
นี่คือบัญชีทางการของ Chicken Me
ขอบคุณที่เป็นเพื่อนกับเรา! 🎉

เราจะส่งข่าวสารล่าสุดผ่านบัญชีทางการนี้เป็นระยะๆ ❤️
เตรียมรับได้เลย! 🎁 *

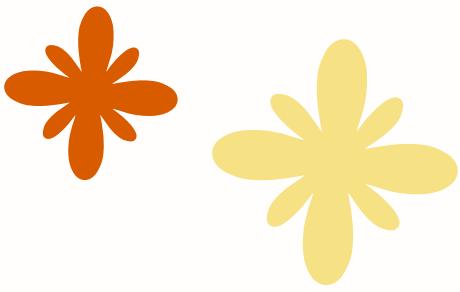
- Broadcast
- Broadcast list
- New broadcast
- Campaigns
- Step messages
- Automatic responses
 - Auto-response messages
 - AI response messages

Chicken Me
👤 3 · @161vmpbo Edit profile

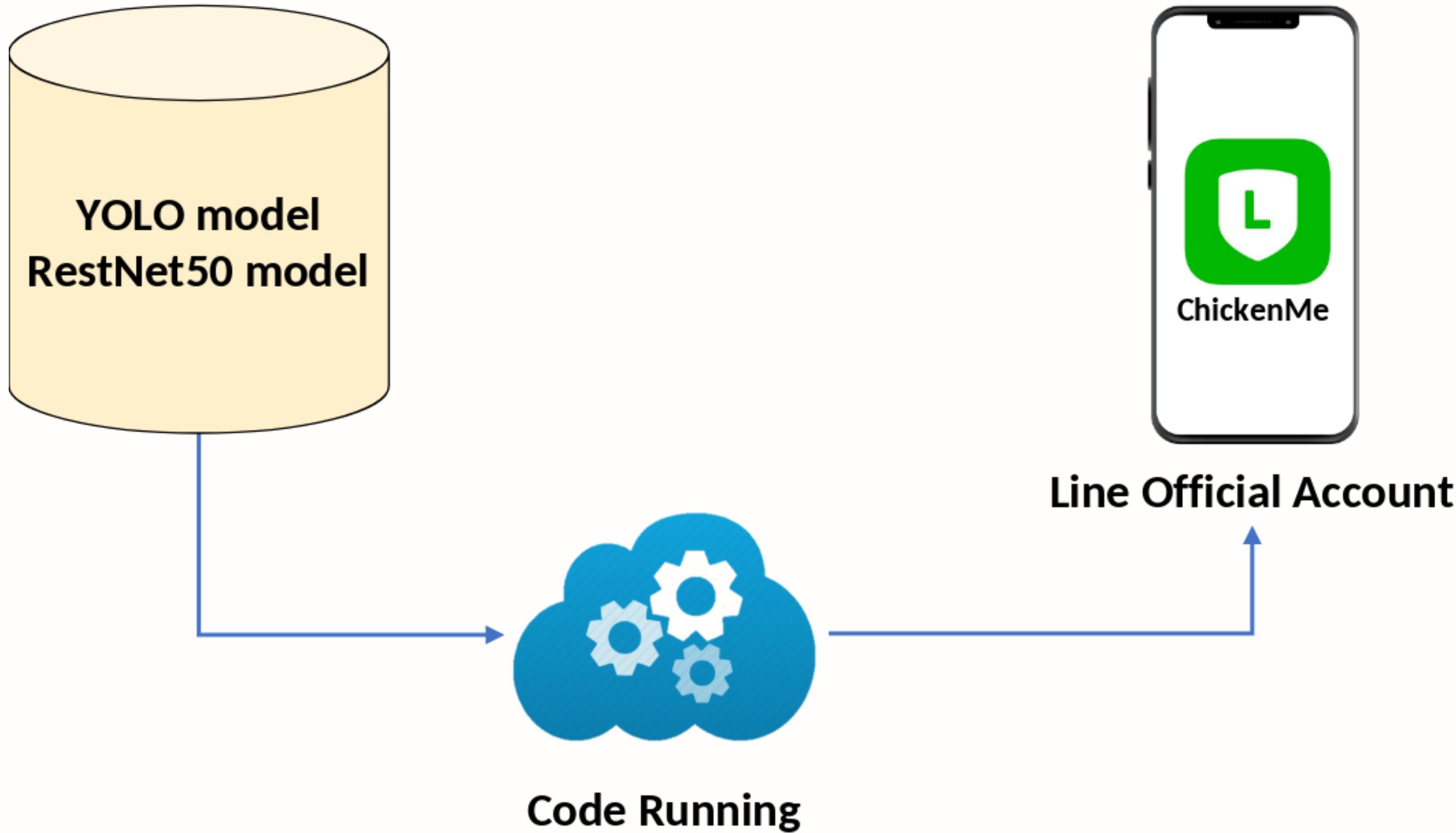
Broadcasts
Broadcast messages to friends.

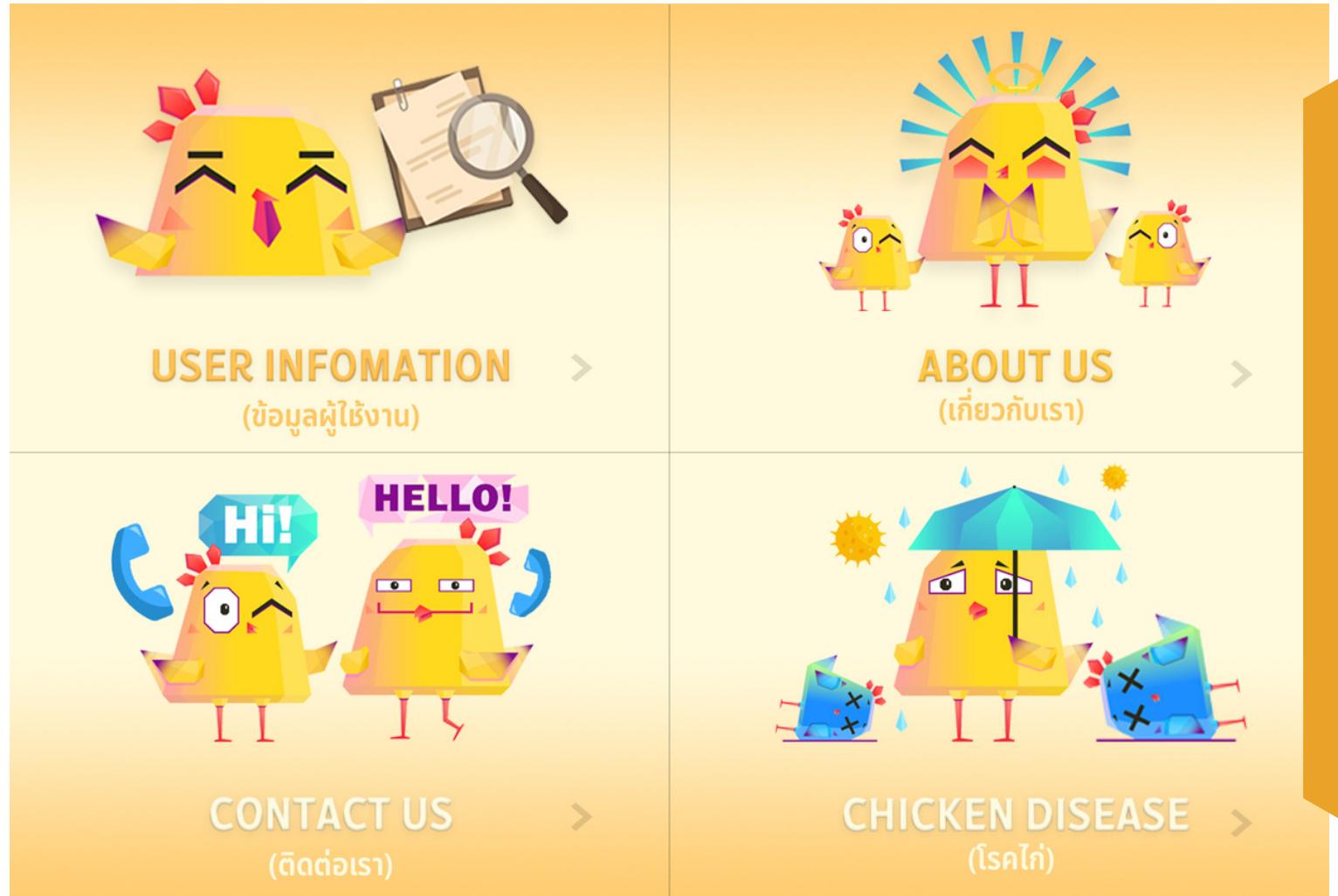
Content
Create rich messages, coupons, and more for your broadcasts.

Send a broadcast Create content



IMPLEMENTATION WITH LINE OA



**USER INFORMATION**

Store customer information such as customer name, farm name, location, etc.

ABOUT US

Describe our project, what we do, why and how we benefit.

CONTACT US

For contact if you have additional questions and concerns.

CHICKEN DISEASE

Explain chicken diseases

RICH MENU

a LINE's feature that can be enabled/disabled. If enabled, it will be displayed at the bottom of the screen which can be chosen from a variety of formats.



THANK YOU

Q&A session