UMAMI

THE NEW TASTE

TEAM

404 Food Not Found

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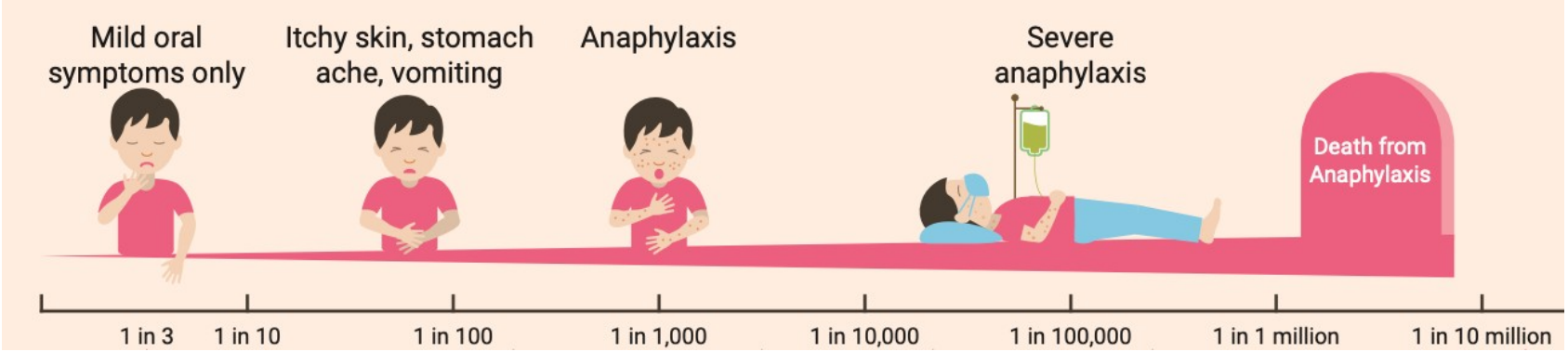
Purpose and Relevance

- **Allergen Awareness:** Enhances food safety with allergen detection.
- **Nutritional Insights:** Empowers healthier choices with nutritional details.
- **Culinary Diversity:** Discovering dishes from worldwide cuisines.
- **Global Trends:** Promotes mindful eating through informed choices.

Food Allergies: Risks and Realities



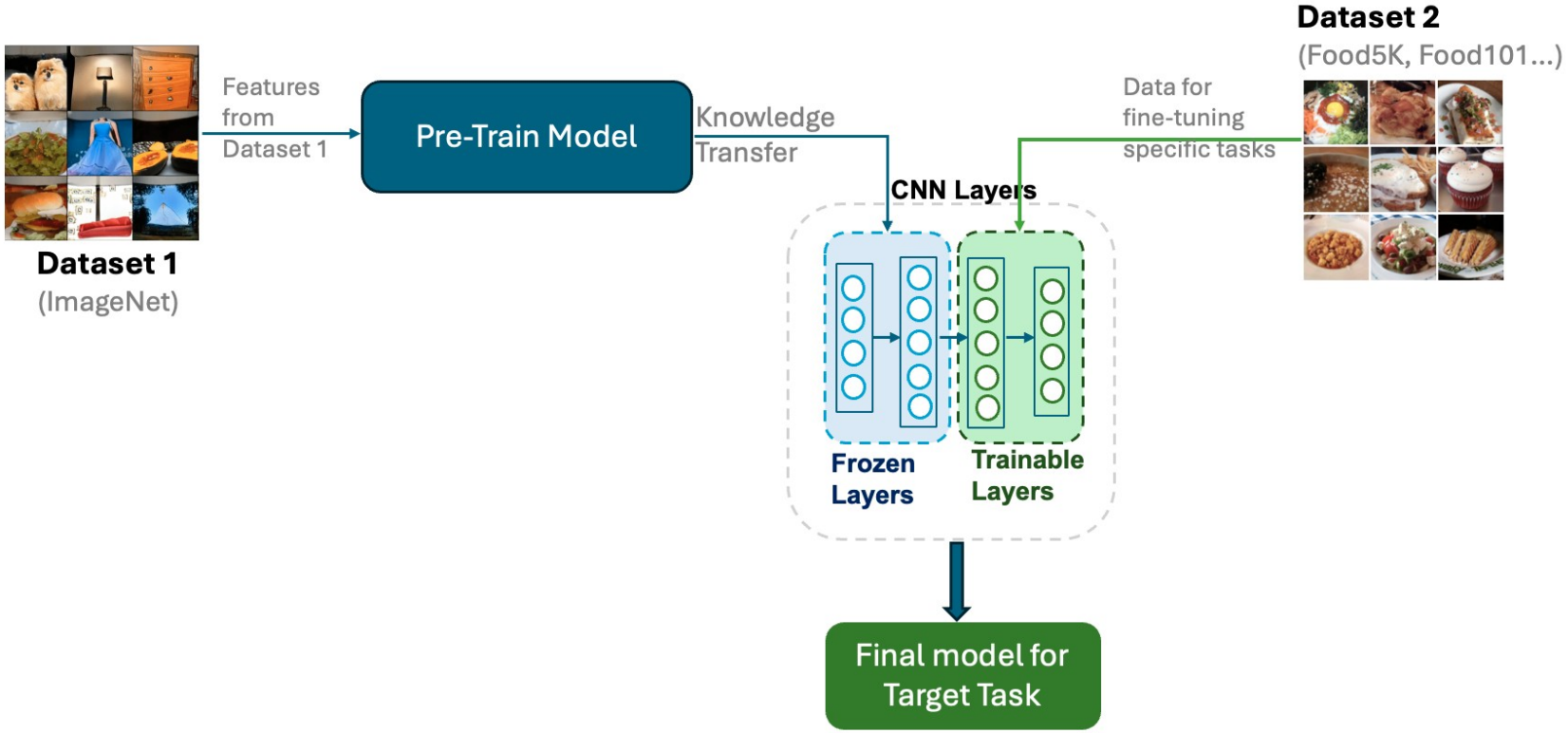
- **Complex Allergens:** One food can contain multiple allergens.
- **Multiple Sensitivities:** People may be allergic to several foods.

Steps in Implementation

1. **Build** a binary food/non-food classifier.
2. **Extend** classification to 101 food categories.
3. **Scale** to 251 fine-grained food categories.

Dataset	Categories	Images
Food5K	2	5 000
Food-101	101	101 000
Food-251X	251	120 000

Transfer Learning Workflow for Image Classification

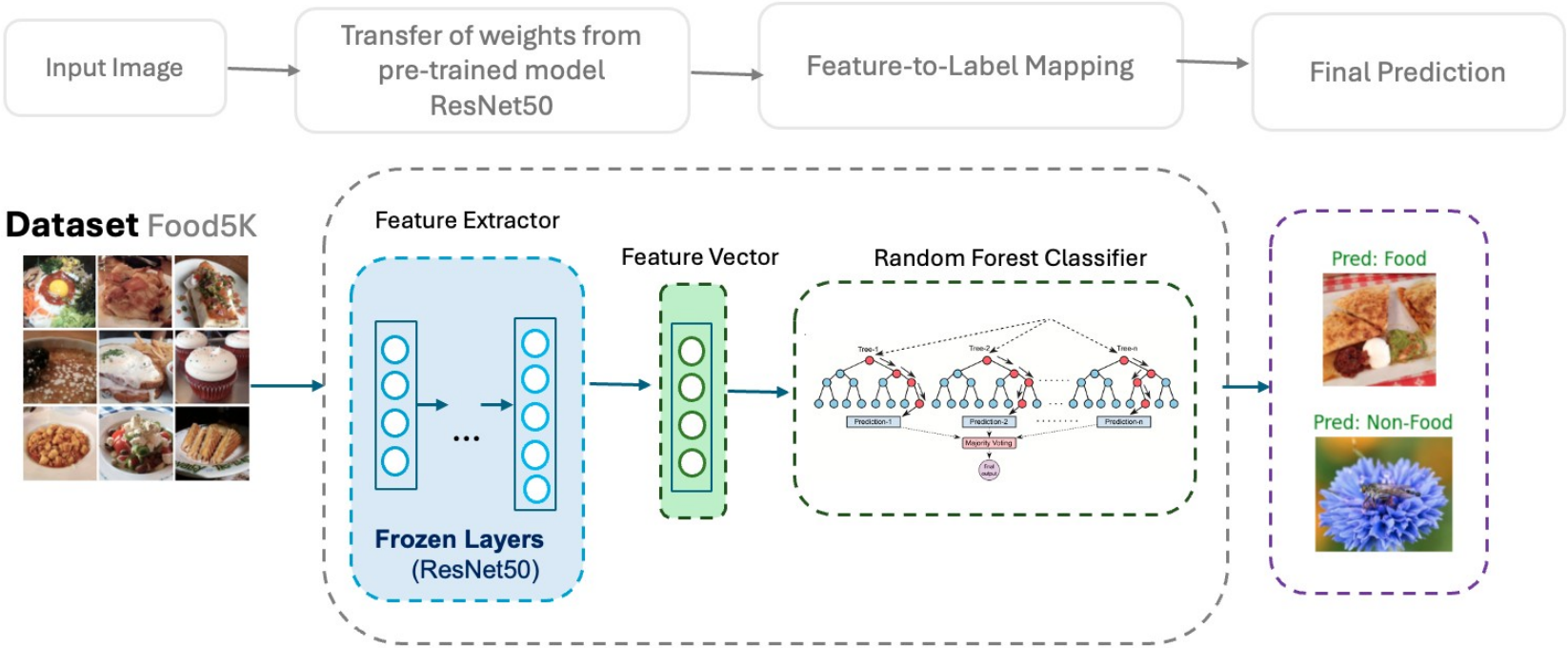


Top Pre-Trained Image Classification Models

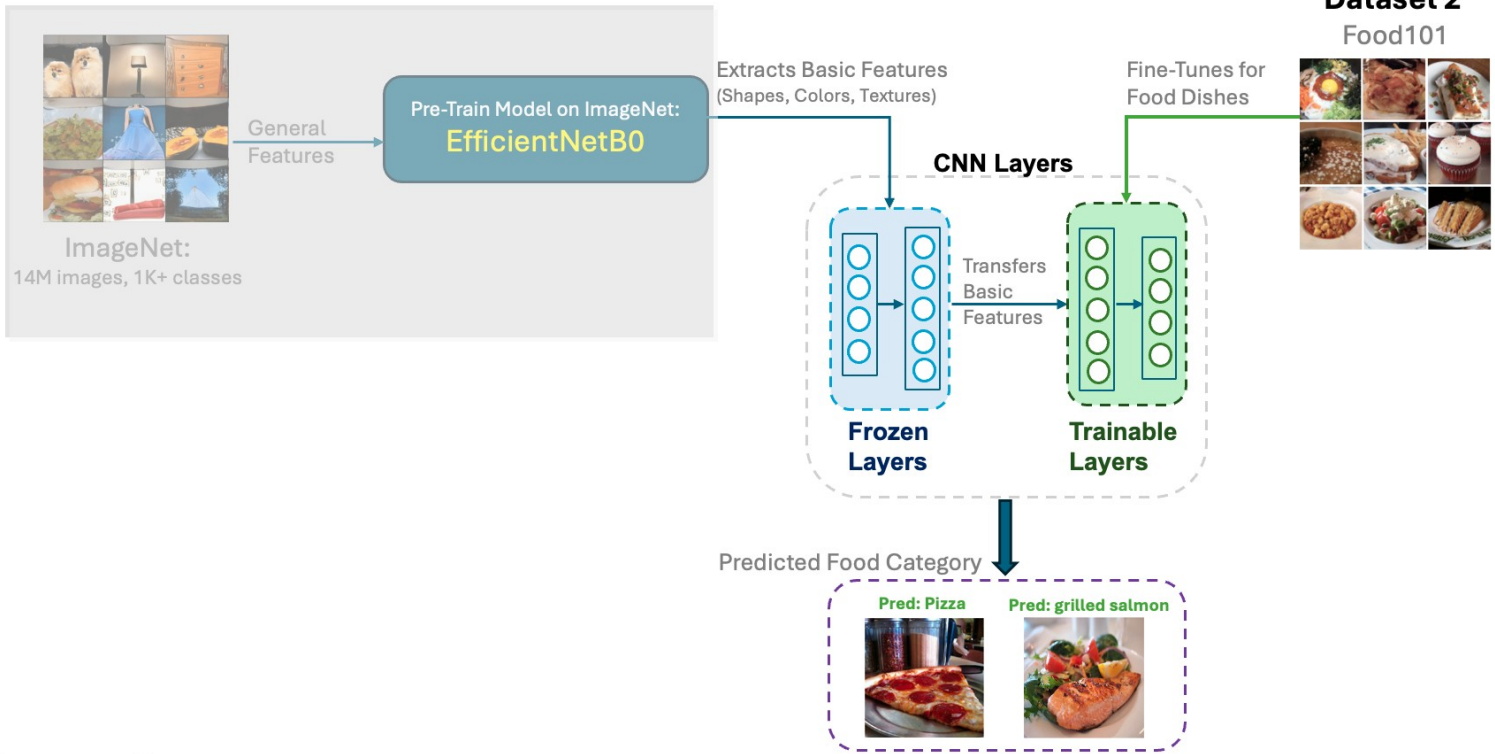
Model	Number of parameters ($\times 10^6$)	Depth	Max. accuracy (%)	FLOPs ($\times 10^9$)
EfficientNetB0	**5.3**	**235**	**77.3**	**0.39**
ResNet50	**25.6**	**50**	**76.2**	**4.1**
VGG16	138	16	71.5	15.3

FLOPs: the number of FLoating-point OPerations

Baseline Model: Binary Classification



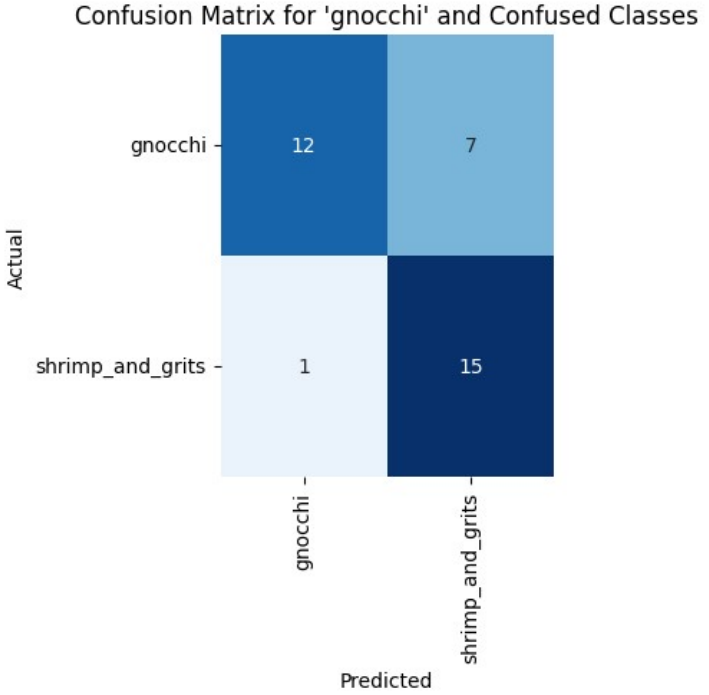
Multi-class model



Challenges in Multi-Class Classification

Gnocchi

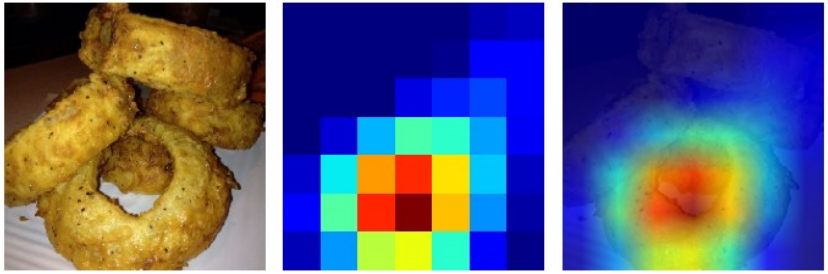
Shrimp



Interpreting Predictions with GradCAM

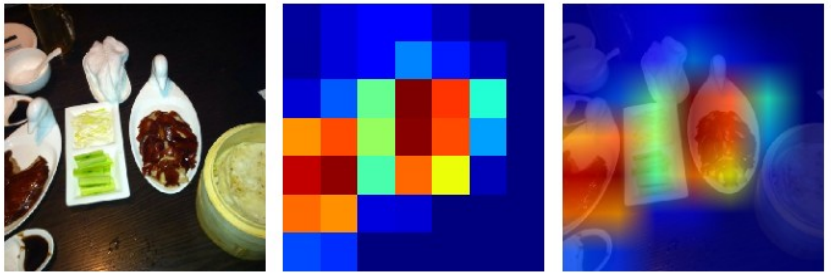
True Label: onion_rings | Predicted: onion_rings (0.43)

Original Image | Heatmap | Overlay Image

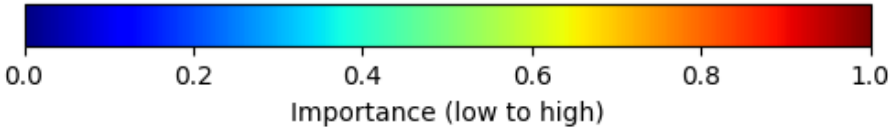


True Label: peking_duck | Predicted: peking_duck (0.69)

Original Image | Heatmap | Overlay Image



Heatmap Color Scale



Tools Behind UMAMI

Machine Learning

TensorFlow

Keras

scikit learn

Data Analysis

pandas

matplotlib

NumPy

seaborn

Deployment

Streamlit

Computer Vision

Grad-CAM

pillow

Project repo: https://github.com/YassBe/UMAMI

DEMONSTRATION

https://goracij.duckdns.org:8501/