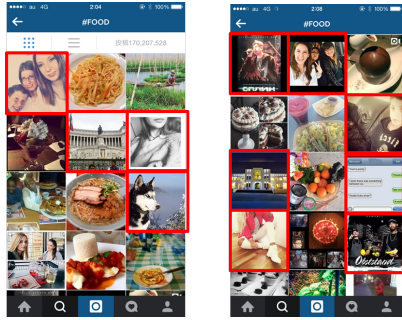


# Highly Accurate Food/Non-Food Image Classification based on a Deep Convolutional Neural Network

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## Background & Contribution

- ◆ Automatic food image analysis is an emerging topic. Public and personal food images are very noisy, so food/non-food classification is necessary.



- ◆ Apply fine-tuned CNN-NIN to classification
- ◆ Use three datasets
- ◆ Investigate dataset dependency of the classification performance by the experiment across the datasets

## Two dataset

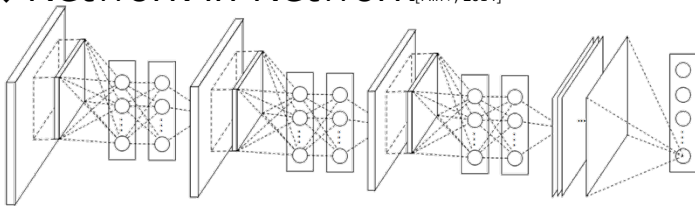
**D1:** Instagram Food/Non-Food Dataset

**D2:** Food-101/Caltech-256 Dataset

Classes	#images (Insta.)	#images (F/C)
Food	4,230	25,250
Non-Food	5,428	28,322
Unspecified	342	-
Total	10,000	53,572

## Methodology: CNN-NIN

- ◆ Convolutional Neural Network<sup>[LeCun+, 1989]</sup>
  - ◆ state-of-the-art in general object and food recognition
- ◆ Network in Network<sup>[Min+, 2014]</sup>



## Experimental Results

Train	Test	Accuracy (Food)	Accuracy (Non-Food)
D1	D1	95%	94%
D2	D2	97%	96%
D1	D2	86%	95%
D2	D1	95%	87%



▼ **D3:** Comparison using dataset in [kagaya+ 2014]

Method	Accuracy
Hand-crafted feature + SVM	89.7±0.73%
Kagaya+, 2014	93.8±1.39%
<b>This study (CNN-NIN)</b>	<b>99.1± 0.81%</b>

## Conclusion

- ◆ Accuracy is 95%, 96% and 99% for D1, D2 and D3 respectively.
- ◆ Evaluation across the dataset between D1 and D2 shows different tendency of degradation of the classification performance.