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あらまし

Feature   DeCAF                      CNN                      Deep Convolutional Activation

キーワード

## Accuracy improvement of food photo attractiveness estimation based on consideration of image features

Kazuma TAKAHASHI<sup>y</sup>, Keisuke DOMAN<sup>yy:y</sup>, Yasutomo KAWANISHI<sup>y</sup>,  
 Takatsugu HIRAYAMA<sup>y</sup>, Ichiro IDE<sup>y</sup>, Daisuke DEGUCHI<sup>yyy:y</sup>, and Hiroshi MURASE<sup>y</sup>

<sup>y</sup> Graduate School of Information Science, Nagoya University  
 Furo-cho, Chikusa-ku, Nagoya-shi, Aichi, 464-8601 Japan  
<sup>yy</sup> School of Engineering, Chukyo University  
 Tokodachi 101, Kaizu-cho, Toyota-shi, Aichi, 470-0393 Japan  
<sup>yyy</sup> Information strategy office, Nagoya University  
 Furo-cho, Chikusa-ku, Nagoya-shi, Aichi, 464-8601 Japan

**Abstract** In our previous research, we proposed a method for predicting the attractiveness of a food photo in order to assist a user to shoot attractive food photos. In this report, we consider applying different image features; 1) Deep Convolutional Activation Feature (DeCAF) extracted from a convolutional Neural Network, and 2) improvement of the extraction region for color and shape features. We also investigated the capability of the proposed method in estimating attractiveness within untrained food categories. Experimental results show that the accuracy of the attractiveness estimation was improved by training with food samples that looked similar to the testing one, which suggested the importance of an adaptive estimator selection based on food appearance.

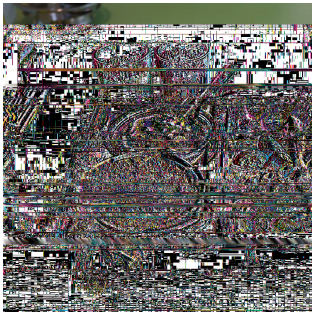
**Key words** Food photo, shooting support, attractiveness, shooting angle

### 1. はじめに

Web

SNS

Web

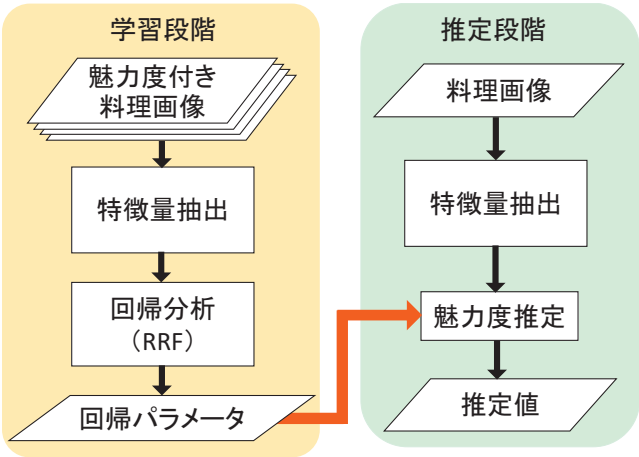


(a)

1

1 (b)

(b)



2

CNN

DeCAF [5]

Random

Regression Forest [6]

2.

3.

4.

5.

2. 料理写真の魅力度推定手法と画像特徴の抽出方法

2

Tian [1]

2

2

Charles [2]

2.1 学習段階：魅力度推定器の構築

2

[3]

GrabCut [7]

GrabCut

[4]

[4]

Random Regression Forest [6]

2.1.1

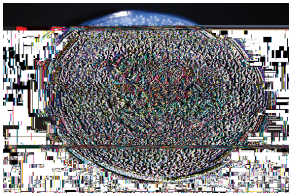
[8]

$L \times a \times b$

$L \times a \times b$  3

$G = (L, a, b)$



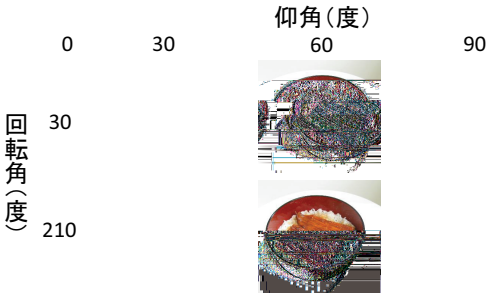


(a)

(a)

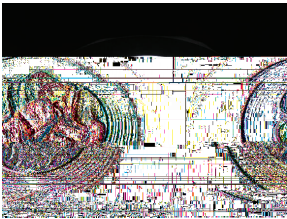
(b)

(b)

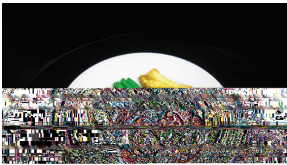


(c)

(c)

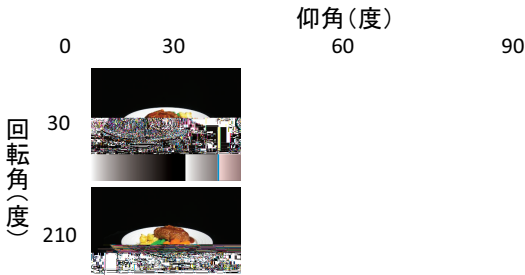


(d)



(e)

(d)



(e)

5

### 3.3 Thurstone の一対比較法による魅力度の算出

| Thurstone | [10] | Thurstone    |
|-----------|------|--------------|
| 36        | 2    | ${}^{36}C_2$ |
| = 630     |      | 3            |

| 1       |             |             |              |             |             |             |
|---------|-------------|-------------|--------------|-------------|-------------|-------------|
| 手法（特徴量） | 平均絶対誤差（MAE） |             |              |             |             |             |
|         | 鰹のたたき       | カレー         | 鰻丼           | ビーフシチュー     | ハンバーグ       | 平均          |
| 1       | 0.28        | 0.21        | 0.18         | 0.19        | 0.25        | 0.22        |
| 2       | <b>0.21</b> | <b>0.12</b> | <b>0.069</b> | <b>0.15</b> | 0.16        | <b>0.14</b> |
| +       | 0.22        | <b>0.12</b> | 0.076        | <b>0.15</b> | <b>0.15</b> | <b>0.14</b> |

| 2 DeCAF DeCAF |             |             |              |              |              |              |
|---------------|-------------|-------------|--------------|--------------|--------------|--------------|
| 手法（特徴量）       | 平均絶対誤差（MAE） |             |              |              |              |              |
|               | 鰹のたたき       | カレー         | 鰻丼           | ビーフシチュー      | ハンバーグ        | 平均           |
| DeCAF         | <b>0.12</b> | <b>0.12</b> | <b>0.061</b> | <b>0.084</b> | 0.097        | <b>0.097</b> |
| DeCAF+ +      | <b>0.12</b> | <b>0.12</b> | 0.069        | 0.085        | <b>0.096</b> | 0.098        |

| leave-one-out Random Regression Forest  |  |  |  |  |  |  |
|-----------------------------------------|--|--|--|--|--|--|
| scikit-learn [12] RandomForestRegressor |  |  |  |  |  |  |
| random.state=2 n_estimators=150         |  |  |  |  |  |  |
| 0 1                                     |  |  |  |  |  |  |
| Thurstone                               |  |  |  |  |  |  |
| MAE Mean Absolute Error                 |  |  |  |  |  |  |
| 4.1.2                                   |  |  |  |  |  |  |
| 5                                       |  |  |  |  |  |  |
| 1 1                                     |  |  |  |  |  |  |
| 60                                      |  |  |  |  |  |  |
| DeCAF DeCAF                             |  |  |  |  |  |  |
| 2 2                                     |  |  |  |  |  |  |
| 5 DeCAF 1                               |  |  |  |  |  |  |
| 2                                       |  |  |  |  |  |  |

4. 評価実験

| DeCAF |  |  |  |  |  |  |
|-------|--|--|--|--|--|--|
| 1     |  |  |  |  |  |  |

4.1 実験 1：画像特徴の比較

3.

| 4.1.1  |    |    |    |   |  |  |
|--------|----|----|----|---|--|--|
| L*a*b* | L* | a* | b* | 8 |  |  |
| 36     |    |    |    |   |  |  |

| De-       |       |  |  |  |  |  |
|-----------|-------|--|--|--|--|--|
| CAF       |       |  |  |  |  |  |
| Ca e [11] | DeCAF |  |  |  |  |  |

