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キーワード

Ingredients Estimation in a Dish by Learning from a Large Number of Recipes with Images

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Abstract In this report, we propose a method for estimating the ingredients contained in the dish in an input food image. Recently, the number of services that analyzes the preferences of an individual by recording daily meals, for improving of health, is increasing. Conventional works that try to realize such services, estimate the calorie from the name of the dish detected from the image. However, in practice, different ingredients may be used in the same kind of dishes, so only recognizing the type of a dish is insufficient. Therefore, we propose a method for estimating the ingredients in the dish in an input food image. Since the color and the shape features of an ingredient tend to appear in a dish, the proposed method extracts image feature from the food image and builds classifiers. As a result of an evaluation experiments, we confirmed that the performance of the classifier exceeds random classification.

Key words Food image, ingredient detection, image feature

1. まえがき

1

“goo

” [1] 10 “Food-Log” [2]

[3]

[4] [3]

[4]

2.

3.

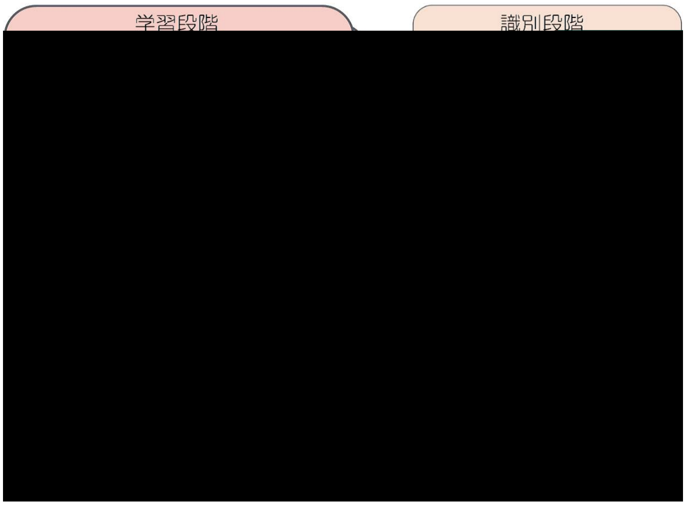
4. 5.

2. 大量の画像付き料理レシピの学習による料理の素材推定

2.1 手法概要

2

1



[redacted]

1

2.2 学習段階

1

SVM

2.2.1

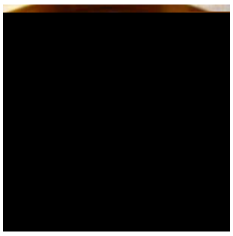
2. 3.

9

2.2.2

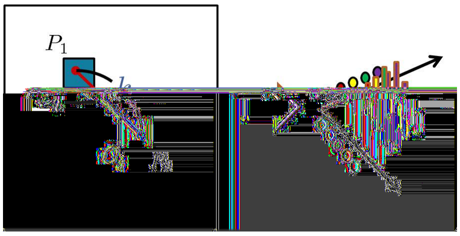
a) : HSV

HSV



2

3



4

HSV HSV

HSV

hue saturation value

HSV

[8]

HSV

HSV

(1)

HSV

$$c_{ij} = (h_i, s_j) \quad (0 \leqq i \leqq m, 0 \leqq j \leqq n) \tag{1}$$

b) :

Huang

[9].

HSV (1)

c_i $0 \leqq i \leqq m$ p_1 k

p_2 c_j

c) : HOG

HOG Histograms of Oriented Gradients

HOG Dalal

[10]

HOG (2), (3)

(x, y) $m(x, y)$ $\theta(x, y)$

$n \times n$

L2 $\mathbf{x}$

x_i^2 $\mathbf{x}$ i ϵ

$\epsilon \ll \sqrt{\sum_i x_i^2}$ $\mathbf{z}$

L2 (6)

HOG

$$m(x, y) = \sqrt{f_x(x, y)^2 + f_y(x, y)^2} \tag{2}$$

$$(x, y) = \tan^{-1}\frac{f_x(x, y)}{f_y(x, y)} \tag{3}$$

$$f_x(x, y) = L(x+1, y) - L(x-1, y) \tag{4}$$

$$f_y(x, y) = L(x, y+1) - L(x, y-1) \tag{5}$$

$$\mathbf{z} = \frac{\mathbf{x}}{\sqrt{\sum_i x_i^2 + \epsilon}} \tag{6}$$

2.2.3

2.2.2

SVM Support Vector Machine [11]

SVM 2

SVM

SVM

2.3 識別段階

1

2.3.1

2.3.2

1

	28	7
	43,916	10,884
	19,461	8,768
	18,745	4,658
	16,343	5,640
	15,083	3,730
	14,832	4,793
	11,681	2,692
	9,991	2,453
	9,432	2,321
	7,676	1,851

3. 実験

3.1 実験条件

3.1.1

[12]

44

35

2

28 7

10

1

3.1.2

SVM Chang LIBSVM [13]

SVM RBF Radial Basis Function

3.1.3

3.1.1

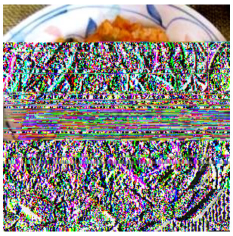
HSV

HSV HOG

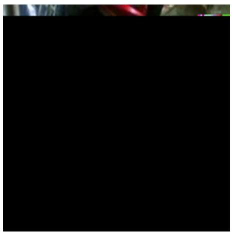
3.1.4

F

F



5



6

a)

N_t

N_s precision 7

$$\text{precision} = \frac{N_t}{N_s} \tag{7}$$

b)

N_t N_m

recall 8

$$\text{recall} = \frac{N_t}{N_m} \tag{8}$$

c) F

F F

(9)

$$= \frac{2 \quad \text{precision} \quad \text{recall}}{\text{precision} \quad \text{recall}} \tag{9}$$

3.2 実験結果

7 $N_t = 0.5$

$N_s = 0.5$ $N_m =$

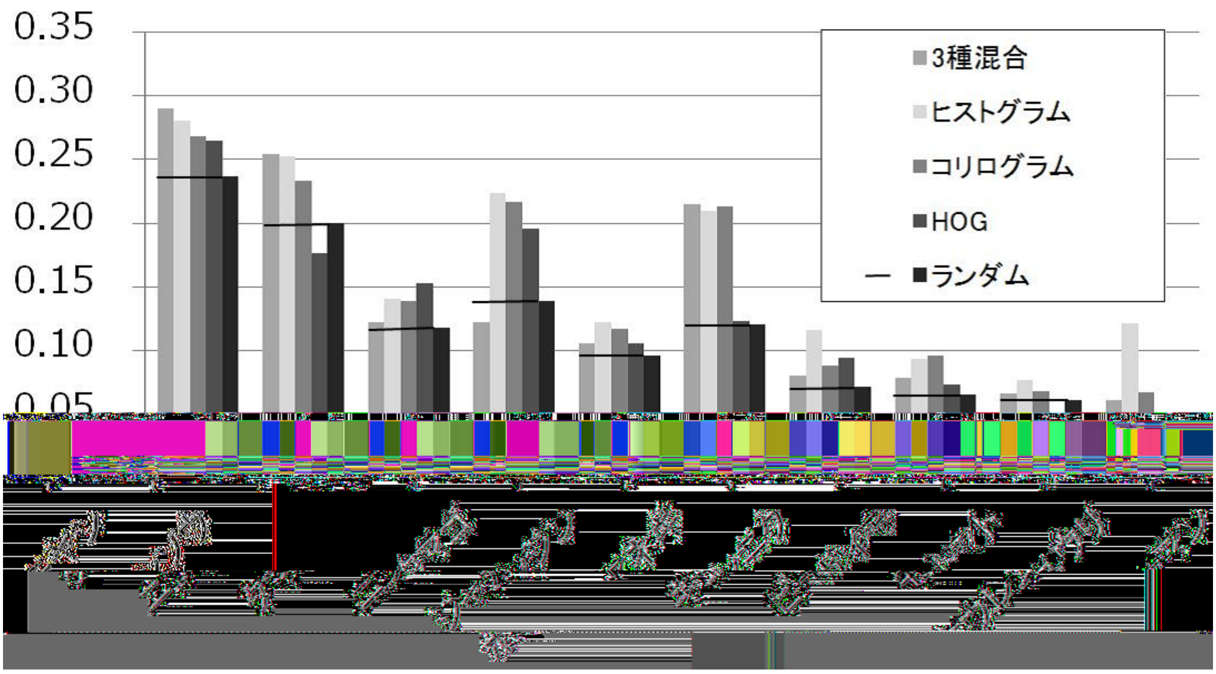
HSV

F

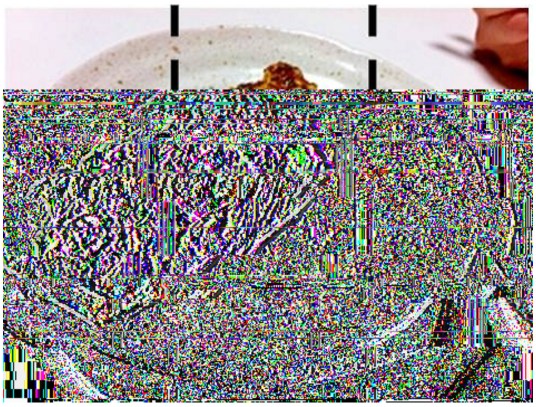
5

6

4. 考察



7　F



8

8

7

2

3

2

HOG　F

HOG

3

HSV

5. むすび