'RUBRIC'

Mid Semester Examination

Monsoon 2024 | Computational Gastronomy

3rd October 2023 | Time: 50 Minutes [**Max 60 Points**]

Roll Number: **Name:**

Signature:

INSTRUCTIONS

MCQs: Please **clearly tick the correct answer** in the MCQs with no ambiguity/overwriting. **Ambiguous entries will get negative points.** Note the **negative marking** schema **in MCQs.**

Short-Answer Questions: Write your answers within the allocated space only.

THE QUESTION ORDER AND OPTIONS (in MCQs) ARE SHUFFLED. DON'T COPY.

1. Choose the correct alternative. [$15 \times +2/-1 = +30/-15$]

(1) According to the notion of Computational Gastronomy, ***the recipe size can never be—***

(a) $s = 1$ (b) $s > 1$

(c) $s > 80$ (d) $2 \leq s \leq 40$

(2) Which of the following techniques for processing food is arguably the oldest human discovery?

(a) Sautéing (b) Roasting

(c) Frying (d) Boiling

(3) 'Cumulative Recipe Size Distribution' of cuisines are of the following nature—

(a) Gaussian/Normal (b) Sigmoidal

(c) Delta Function (d) Uniform

(4) Which of the following is the **not a correct statement** in the context of the 'Food Pairing Hypothesis' proposed by Chef Heston Blumenthal?

(a) Ingredients that do not taste similar tend to be used less together in the recipes.

(b) Ingredients that taste similar tend to be used more frequently together in the recipes.

(c) Ingredient pairs with similar taste are expected to be found in recipes with high frequencies.

(d) Ingredient pairs with dissimilar taste are expected to be found in recipes with high frequencies.

(5) The 'culinary fingerprint' of cuisine is defined so as to capture its—

(a) religious importance. (b) political importance.

(c) uniqueness vis-à-vis other cuisines. (d) economic importance.

(6) The application of the Itemset Mining algorithm with data of recipes in a cuisine treats the cuisine analogous to—

(a) customer transactions comprising the purchase of products from a market.

(b) a network of recipes with shared ingredients.

(c) a network of ingredients with shared recipes.

(d) transactions comprising the purchase of products from a market.

(a, d)

(7) The consistent nature of power law across the world cuisines in their 'frequency-rank distribution' of ingredients suggests that—

(a) all cuisines tend to evolve to suggest unequal use of available ingredients.

(b) the most popular ingredient is always the same in all cuisines.

(c) the top 10 most popular ingredients are always the same in all cuisines.

(d) all ingredients are equally frequently used in the cuisines.

(8) The longer tail of the recipe size distribution (recipes with significantly larger sizes when compared to the mean) reflects the following—

(a) recipes that are too simple and easy to transmit across generations.

(b) recipes that are too difficult to transmit across generations through written texts.

(c) existence of large and complex recipes with festive feasts, royal delicacies, and such.

(d) existence of small yet complex recipes with festive feasts, royal delicacies, and such.

(9) Frequent Itemset Mining algorithm when applied to the data of recipes and their ingredient composition captures _____.

(a) highly similar recipes

(b) most frequently consumed ingredients

(c) ingredient rarely used together

(d) ingredient tuples co-used in recipes

(10) Category Composition Statistics captures _____.

(a) dominant ingredients in a cuisine

(b) dominant ingredient categories critical for the food pairing pattern

(c) dominant ingredient categories in a cuisine

(d) dominant ingredient categories for the health implications

(11) Which of the following is TRUE about the category composition statistics of cuisines?

(a) It represents the frequency with which ingredients are used/represented in a cuisine.

(b) In the category composition matrix computed for a set of cuisines, 'the sum over all values for any ingredient category' is one (1).

(c) In the category composition matrix computed for a set of cuisines, 'the sum over all values for any cuisine' is one (1).

(d) In the category composition matrix computed for a set of cuisines, 'the sum over all values across all of its rows and columns' is one (1).

(12) If F_i and F_j represent the flavor profiles of ingredients i and j, their flavor pairing is depicted by—

(a) $F_i \cup F_j$

(b) $F_i \cap F_j$

(c) $\frac{F_i \cap F_j}{F_i \cup F_j}$

(d) $\frac{F_i \cup F_j}{F_i \cap F_j}$

(13) Which of the following regional cuisines of India appeared as an outlier in terms of its food pairing index, compared to the rest of the cuisines?

(a) South Indian

(b) Gujarati

(c) Mughlai

(d) Jain

(14) Frequency rank distribution of various world cuisines suggests that—

(a) all ingredients are equally popular.

(b) the same ingredient is most popular across cuisines.

(c) some ingredients are far more frequently used than most others.

(d) spices are the most popularly used ingredients across all cuisines.

(15) The Z-score, when applied to food pairing computation, measures the statistical significance of—
(a) the difference in perceived taste between two cuisines.
(b) the statistical significance of positive/uniform food pairing in a cuisine.
(c) the statistical significance of negative/contrasting food pairing in a cuisine
(d) the difference between the average food pairing value of a cuisine and that of its random counterpart.

2. Choose the correct alternative. [8 × 2 = 16]

(1) Which aspect of brinjal (also known as eggplant or aubergine), among the earliest agricultural produce that was genetically modified, was improved for its—
(a) dark purple color
(b) bell shape
(c) insect resistance
(d) all of the these

(2) Which among the following is true about 'The Impossible Burger?'
(a) It features a patty made from insects.
(b) It is impossible to eat this burger in one sitting.
(c) It features a plant-based patty that tastes like roasted meat.
(d It features a meat patty that tastes like roasted potato.

(3) Which of the following is **not** a spice?
(a) Clove
(b) Cinnamon
(c) Coriander
(d) Cardamom

(4) Which of the following is **the most recently introduced** processed food, as per the 'Scientific American' article discussed in class?
(a) Tang
(b) High Fructose Corn Syrup
(c) Lab Grown Meat
(d) Chicken Nuggets

(5) Sugar was invented in _____.
(a) China
(b) India
(c) Japan
(d) USA

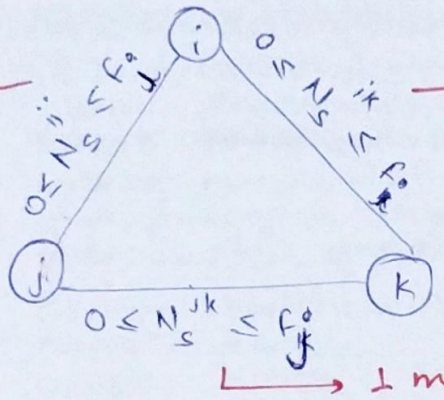
(6) RecipeDB is a structured repository of around _____ recipes from across the globe.
(a) 10^{30}
(b) 10^{9}
(c) 10^{5}
(d) 10^{4}

(7) Which of the following ingredients was **not** among the top 9 ingredients contributing the most to the food pairing pattern in Indian cuisine?
(a) Cayenne
(b) Tamarind
(c) Garlic
(d) Cinnamon

(8) Which of the following ingredient is known to cause hallucinations?
(a) Nutmeg
(b) Kidney beans
(c) Asparagus
(d) Lemon

2. A recipe (R) uses three ingredients i, j, and k having flavor profiles F_i, F_j, and F_k, respectively, such that $F_i < F_j < F_k$. **What are the lower and upper bounds for their average flavor/food pairing value ($\overline{N_s}^R$)? Derive with clearly mentioned steps.** **[6]**

1 mark



→ 1 mark

→ 1 mark

[3 marks]

≤ → sign is important

(0.33 × 3)

lower bound $= \dfrac{0+0+0}{3} = 0$ → 1 mark

Upper bound $= \dfrac{f_k^* + f_i^* + f_j^*}{3}$ → 1 mark

final answer :-

$$0 \le \overline{N_s}^R \le \frac{2f_i + f_j}{3}$$ → 1 mark.

given 1 grace if some one tried to make diagram.

3. Let's assume that the culinary practices in the world are divided into **ten cuisines** each with their idiosyncratic patterns of ingredient uses. Together all the recipes across these ten cuisines are referred to as the World cuisine (W). The number of recipes used in each cuisine are **not** the same. The number of ingredients and the exact set of ingredients used **partially overlap** across the ten cuisines. We define **the overrepresentation of an ingredient I in cuisine C as O_I^C** by using its popularity in the cuisine, where **F_I^C is the fraction of recipes in which an ingredient I is used in cuisine C**, as follows:

$$O_I^C = \frac{F_I^C}{F_I^W}$$

The number of times (frequency) with which an ingredient I is used in cuisine C is N_I^C and the frequency of any ingredient I in a cuisine C is nonzero and $N_I^C \leq N_I^W$. **[4+2+2=8]**

(a) What are the lower and upper limits for O_I^C? Briefly explain your answer?
(b) State the range of values of O_I^C which indicate 'overrepresentation' and 'underrepresentation' on an ingredient in a cuisine.
(c) Can O_I^C for an ingredient be zero? Why/How?

(a) $O_i^c = (0, \infty)$ → 1 mark → 1 mark [2 marks]

→ ingredient would be used atleast once in a cuisine (Given non-zero).

→ ingredient used once across all recipes in cuisine & no. of recipe in a cuisine is ↑. (2 marks for explanation)

(b) Over representation $O_i^c > 1$ ⟶ 1 mark

$\because f_i^c \to 0 \Rightarrow O_i^c \to 0$ (lower)

Under representation $O_i^c < 1$ ⟶ 1 mark

$O_i^c = \frac{1}{0} \to \infty$ (upper)

(c) O_i^c can't be zero, close to zero. Because freq of any ingredient in a cuisine is non-zero. ⟶ 1 mark

$\Rightarrow f_i^c > 0 \not\Rightarrow O_i^c > 0$. ⟶ 1 mark.