

Problem Statement

When a user adds a question to Quora, we automatically suggest topics which might be relevant to the question. For example, a question about Dijkstra's algorithm would probably fit well under the topics "Algorithms" and "Graph Theory".

We have a pretty good machine learning system in place for generating these topics, but it could always be better. Your goal in this task is to design a question topic labeler.

The input data consists of a training dataset of T questions and an evaluation dataset of E questions. Your labeler should suggest 10 topics for each question in the evaluation set, ordered by relevance.

Input Format

The first line consists of two space-separated integers T and E ($1 \leq T \leq 20000$, $1 \leq E \leq 1000$).

The next $2T$ lines provide the training dataset. Each question in the training dataset is described by two lines:

- One integer N ($1 \leq N \leq 25$), followed by N positive integers (below 250) representing the topic IDs of the question in no particular order. On average, there are approximately 3 topics per question in the dataset.
- One string (between 1 and 500 printable ASCII characters), the question text. The average question text length is 70 characters.

The next E lines provide the evaluation dataset. Each question in the evaluation dataset is described by one line (between 1 and 500 ASCII characters), the question text.

Output Format

There are T lines in total. The i -th line contains 10 space-separated integers, each representing the topic id of a suggestion for the i -th question in the evaluation dataset. To maximize your score, topic suggestions for a question should be ordered in descending order of relevance.

Sample Input

```
6 4
3 1 2 4
What is the meaning of life?
7 1 2 5 8 9 11 15
What is Quora?
2 14 178
What are the best Google calendar hacks?
3 117 93 125
Why does government of China not value the freedom of speech?
2 65 164
What is the best piece of design ever?
5 197 183 29 170 143
What was the last conversation you had with your father?
Are programming contests fun?
What is machine learning?
How do you code in C++?
Is it possible to sort in linear time?
```

Note: a more comprehensive sample input (with the same training data made available during evaluation) is available here ([input](#), [correct topics](#)). You can use [this script](#) to score your output for the sample dataset.

Sample Output

```
1 2 5 3 7 9 11 10 14 15
2 9 29 3 117 197 1 183 178 15
15 197 170 143 8 5 1 7 2 14
1 8 14 164 125 15 2 65 164 3
```

Scoring

Your score for each question is determined as follows:

$$\frac{\sum_{i=0}^9 \sqrt{10-i} \cdot (guess_i \in questionTopics)}{\frac{\min(|questionTopics|, 10) - 1}{\sum_{i=0}^9 \sqrt{10-i}}}$$

Your raw score is the sum of each question score.

minScore = raw score for classifier that guesses 10 most frequent topics.

Your final score is $200 \cdot \frac{yourRawScore - minScore}{E - minScore}$.

Resource Limits

Your program is limited to 512 MB of memory and must run in 60 seconds or less.