Problem 3617: Find Students with Study Spiral Pattern

Problem Information

Difficulty: Hard
Acceptance Rate: 0.00%
Paid Only: No

Problem Description

Table:

students

+--------------+---------+ | Column Name | Type | +--------------+---------+ | student_id | int | | student_name | varchar | | major | varchar | +--------------+---------+ student_id is the unique identifier for this table. Each row contains information about a student and their academic major.

Table:

study_sessions

+---------------+---------+ | Column Name | Type | +---------------+---------+ | session_id | int | | student_id | int | | subject | varchar | | session_date | date | | hours_studied | decimal | +---------------+---------+ session_id is the unique identifier for this table. Each row represents a study session by a student for a specific subject.

Write a solution to find students who follow the

Study Spiral Pattern

- students who consistently study multiple subjects in a rotating cycle.

A Study Spiral Pattern means a student studies at least

3

different subjects

in a repeating sequence

The pattern must repeat for

at least

2

complete cycles

(minimum

6

study sessions)

Sessions must be

consecutive dates

with no gaps longer than

2

days between sessions

Calculate the

cycle length

(number of different subjects in the pattern)

Calculate the

total study hours

across all sessions in the pattern

Only include students with cycle length of

at least

3

subjects

Return

the result table ordered by cycle length in

descending

order, then by total study hours in

descending

order

.

The result format is in the following example.

Example:

Input:

students table:

+------------+--------------+------------------+ | student_id | student_name | major | +------------+--------------+------------------+ | 1 | Alice Chen | Computer Science | | 2 | Bob Johnson | Mathematics | | 3 | Carol Davis | Physics | | 4 | David Wilson | Chemistry | | 5 | Emma Brown | Biology | +------------+--------------+------------------+

study_sessions table:

+------------+------------+------------+--------------+---------------+ | session_id | student_id | subject | session_date | hours_studied | +------------+------------+------------+--------------+---------------+ | 1 | 1 | Math | 2023-10-01 | 2.5 | | 2 | 1 | Physics | 2023-10-02 | 3.0 | | 3 | 1 | Chemistry | 2023-10-03 | 2.0 | | 4 | 1 | Math | 2023-10-04 | 2.5 | | 5 | 1 | Physics | 2023-10-05 | 3.0 | | 6 | 1 | Chemistry | 2023-10-06 | 2.0 | | 7 | 2 | Algebra | 2023-10-01 | 4.0 | | 8 | 2 | Calculus | 2023-10-02 | 3.5 | | 9 | 2 | Statistics | 2023-10-03 | 2.5 | | 10 | 2 | Geometry | 2023-10-04 | 3.0 | | 11 | 2 | Algebra | 2023-10-05 | 4.0 | | 12 | 2 | Calculus | 2023-10-06 | 3.5 | | 13 | 2 | Statistics | 2023-10-07 | 2.5 | | 14 | 2 | Geometry | 2023-10-08 | 3.0 | | 15 | 3 | Biology | 2023-10-01 | 2.0 | | 16 | 3 | Chemistry | 2023-10-02 | 2.5 | | 17 | 3 | Biology | 2023-10-03 | 2.0 | | 18 | 3 | Chemistry | 2023-10-04 | 2.5 | | 19 | 4 | Organic | 2023-10-01 | 3.0 | | 20 | 4 | Physical | 2023-10-05 | 2.5 | +------------+------------+------------+--------------+---------------+

Output:

+------------+--------------+-----------------+--------------+-------------------+ | student_id | student_name | major | cycle_length | total_study_hours | +------------+--------------+-----------------+--------------+-------------------+ | 2 | Bob Johnson | Mathematics | 4 | 26.0 | | 1 | Alice Chen | Computer Science | 3 | 15.0 | +------------+--------------+-----------------+--------------+-------------------+

Explanation:

Alice Chen (student_id = 1):

Study sequence: Math → Physics → Chemistry → Math → Physics → Chemistry

Pattern: 3 subjects (Math, Physics, Chemistry) repeating for 2 complete cycles

Consecutive dates: Oct 1-6 with no gaps > 2 days

Cycle length: 3 subjects

Total hours: 2.5 + 3.0 + 2.0 + 2.5 + 3.0 + 2.0 = 15.0 hours

Bob Johnson (student_id = 2):

Study sequence: Algebra → Calculus → Statistics → Geometry → Algebra → Calculus → Statistics → Geometry

Pattern: 4 subjects (Algebra, Calculus, Statistics, Geometry) repeating for 2 complete cycles

Consecutive dates: Oct 1-8 with no gaps > 2 days

Cycle length: 4 subjects

Total hours: 4.0 + 3.5 + 2.5 + 3.0 + 4.0 + 3.5 + 2.5 + 3.0 = 26.0 hours

Students not included:

Carol Davis (student_id = 3): Only 2 subjects (Biology, Chemistry) - doesn't meet minimum 3 subjects requirement

David Wilson (student_id = 4): Only 2 study sessions with a 4-day gap - doesn't meet consecutive dates requirement

Emma Brown (student_id = 5): No study sessions recorded

The result table is ordered by cycle_length in descending order, then by total_study_hours in descending order.

Code Snippets

MySQL:

```
# Write your MySQL query statement below
```

MS SQL Server:

```
/* Write your T-SQL query statement below */
```

PostgreSQL:

```
-- Write your PostgreSQL query statement below
```

Oracle:

```
/* Write your PL/SQL query statement below */
```

Pandas:

```
import pandas as pd

def find_study_spiral_pattern(students: pd.DataFrame, study_sessions:
pd.DataFrame) -> pd.DataFrame:
```

Solutions

MySQL Solution:

```
# Write your MySQL query statement below
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PostgreSQL Solution:

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-- Write your PostgreSQL query statement below
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Pandas Solution:

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