Dataframe_SQL

December 22, 2018

1 Setup and Create Database Connection

```
In [1]: import pandas as pd
        import sqlalchemy as sa
```

```
In [2]: conn_string = "postgresql://irs1318:irs1318@localhost:5432/scouting"
        engine = sa.create_engine(conn_string)
        conn = engine.connect()
```

2 Multi-table Join

```
In [3]: sql = sa.text(
        """
        SELECT events.name AS event, events.season AS season, dates.name AS date,
               levels.name AS level, matches.name AS match, alliances.name AS alliance,
               stations.name AS station, teams.name AS team, phases.name AS phase,
               actors.name AS actor, tasks.name AS task, measuretypes.name AS measuretype,
               attempts.name AS attempt, reasons.name AS reason,
               measures.successes AS successes, measures.attempts AS attempts,
               measures.cycle_times as cycle_times, measures.capability as capability

            FROM teams FULL OUTER JOIN measures
                ON teams.id=measures.team_id
                LEFT JOIN tasks ON tasks.id = measures.task_id
                LEFT JOIN phases ON phases.id = measures.phase_id
                LEFT JOIN events ON events.id = measures.event_id
                LEFT JOIN actors ON actors.id = measures.actor_id
                LEFT JOIN matches ON matches.id = measures.match_id
                LEFT JOIN levels ON levels.id = measures.level_id
                LEFT JOIN alliances ON alliances.id = measures.alliance_id
                LEFT JOIN stations ON stations.id = measures.station_id
                LEFT JOIN measuretypes ON measuretypes.id = measures.measuretype_id
                LEFT JOIN attempts ON attempts.id = measures.attempt_id
                LEFT JOIN reasons ON reasons.id = measures.reason_id
                LEFT JOIN dates ON dates.id = measures.date_id
            WHERE events.name = 'wayak' AND events.season = '2018' AND teams.name = '1318' AND
            ORDER BY matches.name, teams.name, phases.name, tasks.name, actors.name;
        """)
        df_matches = pd.read_sql(sql, conn)
        df_matches
```

```
Out[3]:    event  season                 date level  match alliance station  team  \
        0  wayak    2018  2018-03-16T11:14:00  qual  003-q      red       2  1318
        1  wayak    2018  2018-03-16T11:49:00  qual  008-q     blue       3  1318
        2  wayak    2018  2018-03-16T12:31:00  qual  014-q     blue       3  1318
        3  wayak    2018  2018-03-16T14:13:00  qual  020-q      red       2  1318
        4  wayak    2018  2018-03-16T14:41:00  qual  024-q     blue       3  1318
        5  wayak    2018  2018-03-16T15:44:00  qual  033-q     blue       1  1318
        6  wayak    2018  2018-03-16T16:56:00  qual  039-q      red       1  1318
        7  wayak    2018  2018-03-16T18:27:00  qual  052-q      red       2  1318
        8  wayak    2018  2018-03-17T09:30:00  qual  056-q     blue       3  1318
        9  wayak    2018  2018-03-17T10:05:00  qual  061-q     blue       1  1318

          phase  actor         task measuretype  attempt reason  successes  attempts  \
        0  auto  robot  placeSwitch       count  summary     na          1         1
        1  auto  robot  placeSwitch       count  summary     na          1         1
        2  auto  robot  placeSwitch       count  summary     na          1         1
        3  auto  robot  placeSwitch       count  summary     na          1         1
        4  auto  robot  placeSwitch       count  summary     na          1         1
        5  auto  robot  placeSwitch       count  summary     na          1         1
        6  auto  robot  placeSwitch       count  summary     na          1         1
        7  auto  robot  placeSwitch       count  summary     na          1         1
        8  auto  robot  placeSwitch       count  summary     na          1         1
        9  auto  robot  placeSwitch       count  summary     na          1         1

           cycle_times  capability
        0            0           0
        1            0           0
        2            0           0
        3            0           0
        4            0           0
        5            0           0
        6            0           0
        7            0           0
        8            0           0
        9            0           0
```

3 SQL WITH Statement

```
In [4]: sql = sa.text(
        """
        WITH rmeasures AS (
            SELECT events.name AS event, events.season AS season, dates.name AS date,
               levels.name AS level, matches.name AS match, alliances.name AS alliance,
               stations.name AS station, teams.name AS team, phases.name AS phase,
               actors.name AS actor, tasks.name AS task, measuretypes.name AS measuretype,
               attempts.name AS attempt, reasons.name AS reason,
               measures.successes AS successes, measures.attempts AS attempts,
               measures.cycle_times as cycle_times, measures.capability as capability

            FROM teams FULL OUTER JOIN measures
                ON teams.id=measures.team_id
                LEFT JOIN tasks ON tasks.id = measures.task_id
                LEFT JOIN phases ON phases.id = measures.phase_id
                LEFT JOIN events ON events.id = measures.event_id
                LEFT JOIN actors ON actors.id = measures.actor_id
                LEFT JOIN matches ON matches.id = measures.match_id
                LEFT JOIN levels ON levels.id = measures.level_id
                LEFT JOIN alliances ON alliances.id = measures.alliance_id
                LEFT JOIN stations ON stations.id = measures.station_id
                LEFT JOIN measuretypes ON measuretypes.id = measures.measuretype_id
                LEFT JOIN attempts ON attempts.id = measures.attempt_id
                LEFT JOIN reasons ON reasons.id = measures.reason_id
                LEFT JOIN dates ON dates.id = measures.date_id
            WHERE events.name = 'wayak' AND events.season = '2018')

        SELECT * FROM rmeasures
            ORDER BY team, phase, actor, task;
        """)
        df_teams = pd.read_sql(sql, conn)
        df_teams
```

```
Out[4]:       event season                  date level  match alliance station  team  \
        0     wayak   2018   2018-03-16T11:14:00  qual  003-q      red       2  1318
        1     wayak   2018   2018-03-16T16:56:00  qual  039-q      red       1  1318
        2     wayak   2018   2018-03-16T18:27:00  qual  052-q      red       2  1318
        3     wayak   2018   2018-03-16T15:16:00  qual  029-q      red       1  1318
        4     wayak   2018   2018-03-17T10:05:00  qual  061-q     blue       1  1318
        5     wayak   2018   2018-03-16T15:44:00  qual  033-q     blue       1  1318
        6     wayak   2018   2018-03-16T14:13:00  qual  020-q      red       2  1318
        7     wayak   2018   2018-03-16T12:31:00  qual  014-q     blue       3  1318
        8     wayak   2018   2018-03-16T11:49:00  qual  008-q     blue       3  1318
        9     wayak   2018   2018-03-16T17:24:00  qual  043-q      red       2  1318
        10    wayak   2018   2018-03-16T14:41:00  qual  024-q     blue       3  1318
        11    wayak   2018   2018-03-16T15:16:00  qual  029-q      red       1  1318
        12    wayak   2018   2018-03-17T10:05:00  qual  061-q     blue       1  1318
        13    wayak   2018   2018-03-16T12:31:00  qual  014-q     blue       3  1318
        14    wayak   2018   2018-03-16T11:49:00  qual  008-q     blue       3  1318
        15    wayak   2018   2018-03-17T09:30:00  qual  056-q     blue       3  1318
        16    wayak   2018   2018-03-16T17:24:00  qual  043-q      red       2  1318
        17    wayak   2018   2018-03-16T15:16:00  qual  029-q      red       1  1318
        18    wayak   2018   2018-03-16T14:13:00  qual  020-q      red       2  1318
```

```
19    wayak   2018  2018-03-16T18:27:00  qual  052-q      red       2  1318
20    wayak   2018  2018-03-16T15:44:00  qual  033-q     blue       1  1318
21    wayak   2018  2018-03-16T16:56:00  qual  039-q      red       1  1318
22    wayak   2018  2018-03-16T15:16:00  qual  029-q      red       1  1318
23    wayak   2018  2018-03-16T15:16:00  qual  029-q      red       1  1318
24    wayak   2018  2018-03-17T10:05:00  qual  061-q     blue       1  1318
25    wayak   2018  2018-03-17T09:30:00  qual  056-q     blue       3  1318
26    wayak   2018  2018-03-16T11:49:00  qual  008-q     blue       3  1318
27    wayak   2018  2018-03-16T14:41:00  qual  024-q     blue       3  1318
28    wayak   2018  2018-03-16T14:13:00  qual  020-q      red       2  1318
29    wayak   2018  2018-03-16T12:31:00  qual  014-q     blue       3  1318
...     ...    ...                  ...   ...    ...      ...     ...   ...
2100  wayak   2018  2018-03-16T17:03:00  qual  040-q     blue       2  6831
2101  wayak   2018  2018-03-16T12:52:00  qual  017-q     blue       2  6831
2102  wayak   2018  2018-03-16T14:20:00  qual  021-q     blue       1  6831
2103  wayak   2018  2018-03-16T16:35:00  qual  036-q      red       2  6831
2104  wayak   2018  2018-03-16T11:07:00  qual  002-q     blue       3  6831
2105  wayak   2018  2018-03-16T12:10:00  qual  011-q      red       1  6831
2106  wayak   2018  2018-03-16T18:20:00  qual  051-q      red       3  6831
2107  wayak   2018  2018-03-17T09:58:00  qual  060-q      red       3  6831
2108  wayak   2018  2018-03-16T18:20:00  qual  051-q      red       3  6831
2109  wayak   2018  2018-03-16T11:07:00  qual  002-q     blue       3  6831
2110  wayak   2018  2018-03-17T09:58:00  qual  060-q      red       3  6831
2111  wayak   2018  2018-03-16T14:20:00  qual  021-q     blue       1  6831
2112  wayak   2018  2018-03-17T09:58:00  qual  060-q      red       3  6831
2113  wayak   2018  2018-03-16T12:52:00  qual  017-q     blue       2  6831
2114  wayak   2018  2018-03-16T12:10:00  qual  011-q      red       1  6831
2115  wayak   2018  2018-03-16T11:42:00  qual  007-q      red       1  6831
2116  wayak   2018  2018-03-16T18:20:00  qual  051-q      red       3  6831
2117  wayak   2018  2018-03-16T17:03:00  qual  040-q     blue       2  6831
2118  wayak   2018  2018-03-16T16:35:00  qual  036-q      red       2  6831
2119  wayak   2018  2018-03-16T15:30:00  qual  031-q     blue       1  6831
2120  wayak   2018  2018-03-16T18:34:00  qual  053-q      red       3  6831
2121  wayak   2018  2018-03-16T17:24:00  qual  043-q     blue       2  6831
2122  wayak   2018  2018-03-16T11:07:00  qual  002-q     blue       3  6831
2123  wayak   2018  2018-03-16T17:03:00  qual  040-q     blue       2  6831
2124  wayak   2018  2018-03-16T12:10:00  qual  011-q      red       1  6831
2125  wayak   2018  2018-03-16T18:20:00  qual  051-q      red       3  6831
2126  wayak   2018  2018-03-16T15:30:00  qual  031-q     blue       1  6831
2127  wayak   2018  2018-03-16T18:34:00  qual  053-q      red       3  6831
2128  wayak   2018  2018-03-16T17:24:00  qual  043-q     blue       2  6831
2129  wayak   2018  2018-03-17T09:58:00  qual  060-q      red       3  6831

       phase  actor          task measuretype  attempt reason  successes  \
0       auto  robot      autoLine     boolean  summary     na          1
1       auto  robot      autoLine     boolean  summary     na          1
2       auto  robot      autoLine     boolean  summary     na          1
3       auto  robot      autoLine     boolean  summary     na          1
```

```
4       auto  robot        autoLine     boolean  summary     na           1
5       auto  robot        autoLine     boolean  summary     na           1
6       auto  robot        autoLine     boolean  summary     na           1
7       auto  robot        autoLine     boolean  summary     na           1
8       auto  robot        autoLine     boolean  summary     na           1
9       auto  robot        autoLine     boolean  summary     na           1
10      auto  robot        autoLine     boolean  summary     na           1
11      auto  robot       crossNull     boolean  summary     na           0
12      auto  robot        holdCube     boolean  summary     na           1
13      auto  robot        holdCube     boolean  summary     na           1
14      auto  robot        holdCube     boolean  summary     na           1
15      auto  robot        holdCube     boolean  summary     na           1
16      auto  robot        holdCube     boolean  summary     na           1
17      auto  robot        holdCube     boolean  summary     na           1
18      auto  robot        holdCube     boolean  summary     na           1
19      auto  robot        holdCube     boolean  summary     na           1
20      auto  robot        holdCube     boolean  summary     na           1
21      auto  robot        holdCube     boolean  summary     na           1
22      auto  robot  placeIncorrect     boolean  summary     na           0
23      auto  robot      placeScale       count  summary     na           1
24      auto  robot     placeSwitch       count  summary     na           1
25      auto  robot     placeSwitch       count  summary     na           1
26      auto  robot     placeSwitch       count  summary     na           1
27      auto  robot     placeSwitch       count  summary     na           1
28      auto  robot     placeSwitch       count  summary     na           1
29      auto  robot     placeSwitch       count  summary     na           1
...      ...    ...             ...         ...      ...    ...         ...
2100  teleop  robot  pickupPlatform       count  summary     na           5
2101  teleop  robot  pickupPlatform       count  summary     na           2
2102  teleop  robot  pickupPlatform       count  summary     na           3
2103  teleop  robot  pickupPlatform       count  summary     na           4
2104  teleop  robot  pickupPlatform       count  summary     na           4
2105  teleop  robot  pickupPlatform       count  summary     na           3
2106  teleop  robot  pickupPlatform       count  summary     na           4
2107  teleop  robot    pickupPortal       count  summary     na           3
2108  teleop  robot   placeExchange       count  summary     na           0
2109  teleop  robot   placeExchange       count  summary     na           1
2110  teleop  robot   placeOpponent       count  summary     na           4
2111  teleop  robot      placeScale       count  summary     na           4
2112  teleop  robot      placeScale       count  summary     na           0
2113  teleop  robot      placeScale       count  summary     na           3
2114  teleop  robot      placeScale       count  summary     na           2
2115  teleop  robot      placeScale       count  summary     na           3
2116  teleop  robot      placeScale       count  summary     na           4
2117  teleop  robot      placeScale       count  summary     na           4
2118  teleop  robot      placeScale       count  summary     na           3
2119  teleop  robot      placeScale       count  summary     na           1
2120  teleop  robot      placeScale       count  summary     na           3
```

```
2121  teleop  robot      placeScale       count  summary     na           5
2122  teleop  robot      placeScale       count  summary     na           4
2123  teleop  robot     placeSwitch       count  summary     na           1
2124  teleop  robot     placeSwitch       count  summary     na           0
2125  teleop  robot     placeSwitch       count  summary     na           0
2126  teleop  robot     placeSwitch       count  summary     na           1
2127  teleop  robot     placeSwitch       count  summary     na           0
2128  teleop  robot     placeSwitch       count  summary     na           0
2129  teleop  robot     placeSwitch       count  summary     na           1

      attempts  cycle_times  capability
0            1            0           0
1            1            0           0
2            1            0           0
3            1            0           0
4            1            0           0
5            1            0           0
6            1            0           0
7            1            0           0
8            1            0           0
9            1            0           0
10           1            0           0
11           0            0           0
12           1            0           0
13           1            0           0
14           1            0           0
15           1            0           0
16           1            0           0
17           1            0           0
18           1            0           0
19           1            0           0
20           1            0           0
21           1            0           0
22           0            0           0
23           1            0           0
24           1            0           0
25           1            0           0
26           1            0           0
27           1            0           0
28           1            0           0
29           1            0           0
...        ...          ...         ...
2100         5            0           0
2101         2            0           0
2102         3            0           0
2103         4            0           0
2104         4            0           0
2105         3            0           0
```

```
2106         4           0           0
2107         3           0           0
2108         0           0           0
2109         1           0           0
2110         4           0           0
2111         4           0           0
2112         0           0           0
2113         4           0           0
2114         3           0           0
2115         6           0           0
2116         4           0           0
2117         6           0           0
2118         4           0           0
2119         3           0           0
2120         3           0           0
2121         6           0           0
2122         5           0           0
2123         1           0           0
2124         0           0           0
2125         0           0           0
2126         1           0           0
2127         2           0           0
2128         0           0           0
2129         3           0           0

[2130 rows x 18 columns]
```

4 Aggregate Query

```
In [5]: sql = sa.text(
        """
        WITH rmeasures AS (
            SELECT events.name AS event, events.season AS season, dates.name AS date,
               levels.name AS level, matches.name AS match, alliances.name AS alliance,
               stations.name AS station, teams.name AS team, phases.name AS phase,
               actors.name AS actor, tasks.name AS task, measuretypes.name AS measuretype,
               attempts.name AS attempt, reasons.name AS reason,
               measures.successes AS successes, measures.attempts AS attempts,
               measures.cycle_times as cycle_times, measures.capability as capability

            FROM teams FULL OUTER JOIN measures
                ON teams.id=measures.team_id
                LEFT JOIN tasks ON tasks.id = measures.task_id
                LEFT JOIN phases ON phases.id = measures.phase_id
                LEFT JOIN events ON events.id = measures.event_id
                LEFT JOIN actors ON actors.id = measures.actor_id
                LEFT JOIN matches ON matches.id = measures.match_id
                LEFT JOIN levels ON levels.id = measures.level_id
                LEFT JOIN alliances ON alliances.id = measures.alliance_id
                LEFT JOIN stations ON stations.id = measures.station_id
                LEFT JOIN measuretypes ON measuretypes.id = measures.measuretype_id
                LEFT JOIN attempts ON attempts.id = measures.attempt_id
                LEFT JOIN reasons ON reasons.id = measures.reason_id
                LEFT JOIN dates ON dates.id = measures.date_id
            WHERE events.name = 'wayak' AND events.season = '2018')

        SELECT team, phase, actor, task,
               SUM(successes) AS sum_successes, AVG(successes) AS avg_successes, MAX(successes
               SUM(attempts) AS sum_attempts, AVG(attempts) AS avg_attempts, MAX(attempts) AS
            FROM rmeasures
            GROUP BY team, phase, actor, task
            ORDER BY team, phase, actor, task;
        """)
        df_teams = pd.read_sql(sql, conn)
        df_teams.head()
```

Out[5]:

```
   team phase  actor            task  sum_successes  avg_successes  \
0  1318  auto  robot        autoLine             11            1.0   
1  1318  auto  robot       crossNull              0            0.0   
2  1318  auto  robot        holdCube             10            1.0   
3  1318  auto  robot  placeIncorrect              0            0.0   
4  1318  auto  robot      placeScale              1            1.0   

   max_successes  sum_attempts  avg_attempts  max_attempts  
0              1            11           1.0             1  
1              0             0           0.0             0  
2              1            10           1.0             1  
3              0             0           0.0             0  
4              1             1           1.0             1  
```

5 Compound Query

In [6]:

```
sql = sa.text(
"""
SELECT team, phase, actor, task,
       SUM(successes) AS sum_successes, AVG(successes) AS avg_successes, MAX(successes
       SUM(attempts) AS sum_attempts, AVG(attempts) AS avg_attempts, MAX(attempts) AS

    FROM (
        SELECT events.name AS event, events.season AS season, dates.name AS date,
           levels.name AS level, matches.name AS match, alliances.name AS alliance,
           stations.name AS station, teams.name AS team, phases.name AS phase,
           actors.name AS actor, tasks.name AS task, measuretypes.name AS measuretype,
           attempts.name AS attempt, reasons.name AS reason,
           measures.successes AS successes, measures.attempts AS attempts,
           measures.cycle_times as cycle_times, measures.capability as capability

        FROM teams FULL OUTER JOIN measures
            ON teams.id=measures.team_id
            LEFT JOIN tasks ON tasks.id = measures.task_id
            LEFT JOIN phases ON phases.id = measures.phase_id
            LEFT JOIN events ON events.id = measures.event_id
            LEFT JOIN actors ON actors.id = measures.actor_id
            LEFT JOIN matches ON matches.id = measures.match_id
            LEFT JOIN levels ON levels.id = measures.level_id
            LEFT JOIN alliances ON alliances.id = measures.alliance_id
            LEFT JOIN stations ON stations.id = measures.station_id
            LEFT JOIN measuretypes ON measuretypes.id = measures.measuretype_id
            LEFT JOIN attempts ON attempts.id = measures.attempt_id
            LEFT JOIN reasons ON reasons.id = measures.reason_id
            LEFT JOIN dates ON dates.id = measures.date_id
        WHERE events.name = 'wayak' AND events.season = '2018'
    ) AS r
    GROUP BY team, phase, actor, task
    ORDER BY team, phase, actor, task;
""")
df_teams = pd.read_sql(sql, conn)
df_teams.head()
```

```
Out[6]:    team phase  actor            task  sum_successes  avg_successes  \
        0  1318  auto  robot        autoLine             11            1.0
        1  1318  auto  robot       crossNull              0            0.0
        2  1318  auto  robot        holdCube             10            1.0
        3  1318  auto  robot  placeIncorrect              0            0.0
        4  1318  auto  robot      placeScale              1            1.0

           max_successes  sum_attempts  avg_attempts  max_attempts
        0              1            11           1.0             1
        1              0             0           0.0             0
        2              1            10           1.0             1
        3              0             0           0.0             0
        4              1             1           1.0             1
```

6 match_num Query: Subquery #1

```
In [7]: sql = sa.text(
        """
        SELECT status.event_id as event_id, status.match, schedules.date
                FROM status INNER JOIN schedules
                ON status.event_id=schedules.event_id AND
                status.match=schedules.match
                WHERE date <> 'na' LIMIT 1;
        """)
        df_matches = pd.read_sql(sql, conn)
        df_matches
```

```
Out[7]:    event_id  match                 date
        0     25167  001-q  2018-03-16T11:00:00
```

7 match_num Query: Subquery #2

```
In [8]: sql = sa.text(
        """
        WITH current AS (
            SELECT status.event_id AS event_id,
                    status.match, schedules.date
                FROM status INNER JOIN schedules
                    ON  status.event_id=schedules.event_id AND
                        status.match=schedules.match
                WHERE date <> 'na' LIMIT 1
        )
        SELECT * FROM (
            SELECT ROW_NUMBER() OVER (
                        PARTITION BY team ORDER BY sched.date DESC) AS r,
                    sched.*
                FROM schedules AS sched, current AS c
                WHERE sched.event_id = c.event_id AND sched.date <= c.date)
                AS row_schedule
            WHERE row_schedule.r <= :num_mtchs ORDER BY team, date DESC;
        """).bindparams(num_mtchs=3)
        df_matches = pd.read_sql(sql, conn)
        df_matches.head(9)
```

```
Out[8]:    r     id                 date level  match alliance  team station  event_id
        0  1  61631  2018-03-16T11:00:00  qual  001-q     blue  2148       2     25167
        1  1  61628  2018-03-16T11:00:00  qual  001-q      red  3693       2     25167
        2  1  61629  2018-03-16T11:00:00  qual  001-q      red  4061       3     25167
        3  1  61627  2018-03-16T11:00:00  qual  001-q      red  4120       1     25167
        4  1  61630  2018-03-16T11:00:00  qual  001-q     blue  4125       1     25167
        5  1  61632  2018-03-16T11:00:00  qual  001-q     blue  6076       3     25167
```

8 match_num Query: Entire Query

```
In [11]: sql = sa.text(
         """
         WITH current AS (
             SELECT  status.event_id AS event_id,
                     status.match, schedules.date
```

```
        FROM status INNER JOIN schedules
            ON  status.event_id=schedules.event_id AND
                status.match=schedules.match
        WHERE date <> 'na' LIMIT 1
),
recent_matches AS (
    SELECT * FROM (
        SELECT row_number() over (
                    PARTITION BY team ORDER BY sched.date DESC) AS r,
                sched.*
            FROM schedules AS sched, current AS c
            WHERE sched.event_id = c.event_id AND sched.date <= c.date)
            AS row_schedule
        WHERE row_schedule.r <= :num_mtchs ORDER BY team, date DESC
)
SELECT team, MAX(r) AS matches
    FROM recent_matches
    GROUP BY team ORDER BY team;
""").bindparams(num_mtchs=12)
df_matches = pd.read_sql(sql, conn)
df_matches.head(5)
```

```
Out[11]:    team  matches
         0  1318       11
         1  2148       11
         2  2522       12
         3  2811       12
         4  2915       12
```

9 measure_summary Query

```
In [10]: sql = sa.text(
         """
         WITH
         current AS (
             SELECT status.event_id AS event_id, status.match, schedules.date
                 FROM status INNER JOIN schedules
                     ON status.event_id=schedules.event_id AND
                         status.match=schedules.match
                 WHERE date <> 'na' LIMIT 1
                 ),
         recent_matches AS (
             SELECT * FROM (
                 SELECT row_number() OVER (
                             PARTITION BY team ORDER BY sched.date DESC) AS r,
                         sched.*
                     FROM schedules AS sched, current AS c
```

```
            WHERE sched.event_id = c.event_id AND sched.date <= c.date)
            AS row_schedule
        WHERE row_schedule.r <= :num_mtchs ORDER BY team, date DESC
),
team_match_count AS (
    SELECT team, COUNT(team) AS team_matches
        FROM recent_matches
        GROUP BY team
)
SELECT teams.name AS team, phases.name AS phase, tasks.name AS task,
    actors.name AS actor,
    MAX(team_match_count.team_matches) AS matches,
    SUM(successes) AS sum_successes, MAX(successes) AS max_successes,
    MIN(successes) AS min_successes, COUNT(successes) AS count_successes,
    CAST(SUM(successes) AS FLOAT)/MAX(team_match_count.team_matches)
            AS avg_successes,
    AVG(successes) AS tav_successes,

    SUM(attempts) AS sum_attempts, MAX(attempts) AS max_attempts,
    MIN(attempts) AS min_attempts, COUNT(attempts) AS count_attempts,
    CAST(SUM(attempts) AS FLOAT)/MAX(team_match_count.team_matches)
            AS avg_attempts,
    AVG(attempts) AS tav_attempts,

    SUM(cycle_times) AS sum_cycle_times,
    MAX(cycle_times) AS max_cycle_times,
    MIN(cycle_times) AS min_cycle_times,
    CAST(SUM(cycle_times) AS FLOAT)/MAX(team_match_count.team_matches)
            AS avg_cycle_times,
    AVG(cycle_times) AS tav_cycle_times,
    COUNT(cycle_times) AS count_cycle_times,

    SUM(capability) AS sum_capabilities,
    MAX(capability) as max_capabilities,
    MIN(capability) AS min_capabilities,
    COUNT(capability) AS count_capabilities,
    CAST(SUM(capability) AS FLOAT)/MAX(team_match_count.team_matches)
            AS avg_capabilities,
    AVG(capability) AS tav_capabilities

    FROM (((((((teams FULL OUTER JOIN measures
        ON teams.id=measures.team_id)
        LEFT JOIN tasks ON tasks.id = measures.task_id)
        LEFT JOIN phases ON phases.id = measures.phase_id)
        LEFT JOIN events ON events.id = measures.event_id)
        LEFT JOIN actors ON actors.id = measures.actor_id)
        LEFT JOIN matches ON matches.id = measures.match_id)
        LEFT JOIN team_match_count
```

```
                ON team_match_count.team = teams.name)
        RIGHT JOIN recent_matches
                ON recent_matches.match = matches.name AND
                    team_match_count.team = teams.name AND
                    recent_matches.team = team_match_count.team
    WHERE events.id = :evt_id
    GROUP BY teams.name, tasks.name, phases.name, actors.name
    ORDER BY teams.name, phases.name, tasks.name, actors.name;
""").bindparams(num_mtchs=12, evt_id=25167)
df_matches = pd.read_sql(sql, conn)
df_matches.head(5)
```

```
Out[10]:    team   phase         task  actor  matches  sum_successes  max_successes  \
         0  2148    auto     autoLine  robot        1              1              1
         1  2148    auto     holdCube  robot        1              0              0
         2  2148    auto   pickupCube  robot        1              0              0
         3  2148    auto  placeSwitch  robot        1              0              0
         4  2148  finish    makeClimb  robot        1              0              0

            min_successes  count_successes  avg_successes        ...          \
         0              1                1            1.0        ...
         1              0                1            0.0        ...
         2              0                1            0.0        ...
         3              0                1            0.0        ...
         4              0                1            0.0        ...

            min_cycle_times  avg_cycle_times  tav_cycle_times  count_cycle_times  \
         0                0              0.0              0.0                  1
         1                0              0.0              0.0                  1
         2                0              0.0              0.0                  1
         3                0              0.0              0.0                  1
         4                0              0.0              0.0                  1

            sum_capabilities  max_capabilities  min_capabilities  count_capabilities  \
         0                 0                 0                 0                   1
         1                 0                 0                 0                   1
         2                 0                 0                 0                   1
         3                 0                 0                 0                   1
         4                 0                 0                 0                   1

            avg_capabilities  tav_capabilities
         0               0.0               0.0
         1               0.0               0.0
         2               0.0               0.0
         3               0.0               0.0
         4               0.0               0.0

         [5 rows x 29 columns]
```