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Group 12

Introduction to Artificial Intelligence

Laboratory 7

Variant 2

Description

Return the number of N days between 2 dates. Assumptions:

- The year is 2024
- $N \leq 366$

First of all, we may observe that $N \leq 365$. The largest possible difference in dates inside 2024 is January 1 and December 31 which would give us $N = 365$.

Secondly, our code is slightly modified in that it returns $|N| \leq 365$. Allowing negative values. Suppose the predicate ``interval(Date1, Date2)`` is supplied two dates $Date1 = d1$, $Date2 = d2$ then

- If $d1$ precedes $d2$ then the result is positive (as in problem description)
- If $d2$ precedes $d1$ then the result is negative
- Otherwise, the result is 0

Logic Flow of Solution

Let's use predicate ``interval(Date1, Date2, Interval)`` for this explanation.

Our predicate takes the two supplied date strings ($Date1$, $Date2$) in the format DDMM and extracts the numerical values of day and month, while doing some related format-error checks. For each of the two dates we calculate what number day they are in the whole year.

Let's take a look at how this calculation happens:

Suppose for $Date1$ we have $day1/month1$. We sum up the days of all months preceding $month1$ and then add $day1$ to that result. This will give us the exact numerical value of this date inside the whole year. We perform the same calculation for $Date2$.

Finally, we simply subtract the two numbers and bind the result to ``Interval``.

Main Components of Code

- ``is_leap_year`` and ``days_in_month`` predicates are helper predicates that give us the number of days of a given month in a given year.
- ``total_days_in_prev_months`` predicate is a helper predicate which accumulates all days up to and including the given month. It also takes as input a specific year.
- ``total_days_in_date`` predicate simply returns the order or position of a given date in a year. E.g. February 2nd 2024 is the 32nd day of that year. The result value would be 32.
- ``interval``. There are two such predicates. The first one takes two dates in format DDMM in the year 2024 and binds ``Interval`` to the number of days between those two dates. The second version just writes this number to the output.
- ``test`` and ``test_fail`` predicates are used to test cases that should succeed or fail respectively. This way we can test for errors in our approach.

Challenges

This lab assignment was quite easy, however, some challenges appeared for us. It was a good opportunity to familiarize ourselves a bit more with Prolog and logic programming. We used the concepts of predicates and 'truth' as they appear in the field of logic to complete our assignment. Managing to make our predicates 'functional' (in the sense that, after they find one answer that fits the requirements, they stop searching in the search space) and finding ways to perform the needed steps of our algorithm efficiently were the main challenges we faced.

Remarks

Recursions in our predicates are tail – recursions to aid with related optimizations.