**AdaptivePhys: Adaptive Learning Tool**

============================ 07/28/2024================================

1. Any Feedback on Architecture diagram

2. Request hierarchical rules

3. Questions data per concepts (And also if the student response was correct or incorrect)

 **user\_id**: The unique identifier for each user.

 **skill\_name**: The concept or skill being tested (e.g., 'concept1', 'concept2').

 **correct**: Indicates whether the user's answer was correct (1) or incorrect (0).

 **timestamp**: The time at which the response was given.

 **correct\_predictions**: The predicted probability that the user's next response will be correct, given their current knowledge state.

 **state\_predictions**: The predicted probability that the user knows the concept at that point in time.

**Note**: The state prediction has increased significantly from the previous response, possibly because the BKT model adjusts its beliefs based on sequences of responses and not just individual responses.

**General Interpretation**

* **Correct Predictions**: This represents the model's confidence in the user answering the next question correctly based on their knowledge state and the probabilities of guessing or slipping.
* **State Predictions**: This reflects the model's estimate of the user's knowledge state at each point in time. It is adjusted after each response based on whether the user answered correctly or incorrectly, and the model's internal parameters for learning, forgetting, guessing, and slipping.

user\_id skill\_name correct timestamp correct\_predictions

0 1 concept1 1 2023-06-01 10:00:00 0.49819

1 1 concept1 0 2023-06-01 10:05:00 0.50032

2 1 concept1 1 2023-06-01 10:10:00 0.50149

3 2 concept1 0 2023-06-01 11:00:00 0.49819

4 2 concept1 1 2023-06-01 11:05:00 0.50031

5 2 concept1 0 2023-06-01 11:10:00 0.50150

6 3 concept2 1 2023-06-01 12:00:00 0.99944

7 3 concept2 1 2023-06-01 12:05:00 0.55580

8 3 concept2 0 2023-06-01 12:10:00 0.46702

state\_predictions

0 0.07517

1 0.48782

2 0.71470

3 0.07517

4 0.48703

5 0.71712

6 0.00014

7 0.65836

8 0.79009

user\_id skill\_name correct correct\_predictions state\_predictions

0 1 concept1 1 0.49939 0.57917

1 1 concept1 0 0.50007 0.64689

2 1 concept1 1 0.50057 0.69629

3 2 concept1 0 0.49939 0.57917

4 2 concept1 1 0.49999 0.63854

5 2 concept1 0 0.50058 0.69707

6 3 concept2 1 0.99951 0.00000

7 3 concept2 1 0.55551 0.64895

8 3 concept2 0 0.46704 0.77826

============================ 07/12/2024================================

Next Steps:

1.Padmaja to start the work on system development.

2. Request hierarchical rules

3. Questions data per concepts (And also if the student response was correct or incorrect)

Suggestions:

Add motivating sentences e.g. Let’s start he is learning journey

One Page to show like do you know thermal concepts. Interactive example. 3 or 4 sentences. Very simple product.

Add button to provide the hint! It ill goes learning materials which helps to understand the concept better.

C1 C2 C3

Misconceptions

I1 I2 I3 | I123 I4 I5 | I6|I7I8

O11 O21

012 O22

O13 O23

===========================07/19/2024==================================

Padmaja:

1. How many students we should consider?

2. What are the concepts and how assessment questions are grouped and distributed over the concepts. (Verify with PDFs)

2. Total number of concepts?

3. Total misconceptions

I1 I2 I3 | I4 I5 I6 | I7, I8 | I9 I10 | I11, I12, I13,I14,I15,I16 |I17 I18 |I19 , I20 , I21, I22,I23,I24,I25,I26

C1 : Nature of heat (Students’ conceptions of heat)

7, 10, 11, 13, 15, 18, 22, 23, 24

C2 : Nature of Temperature( Students’ conceptions of temperature)

1, 5, 7, 9, 10, 11, 14, 15, 16, 18, 19, 21, 22, 25, 26

C4 : Heat transfer (Students’ conceptions about heat transfer and temperature change)

C5 : Status of objects (Students' conceptions about “thermal properties” of materials.)

# Sample data

data = {

'user\_id': [47922625, 47922625, 47923073, 47923073, 47923073, 47922794, 47922794, 47922794, 47922794, 47922794],

'skill\_name': ['Nature\_of\_heat', 'Nature\_of\_heat', 'Nature\_of\_heat', 'Nature\_of\_heat', 'Nature\_of\_heat', 'Nature\_of\_Temperature', 'Nature\_of\_Temperature', 'Nature\_of\_Temperature', 'Nature\_of\_Temperature', 'Nature\_of\_Temperature'],

'correct': [1, 1, 0, 0, 1, 0, 1, 0, 0, 1],

}

Participants: Dr Gao, Padmaja

* We will consider misconceptions rather than concepts while implementing Bayesian Knowledge Transfer Algorithm.
* In Bayesian Knowledge Transfer

If probability > 80 % then student has mastered the concept

If probability < 30 %. Don’t recommend more questions to student. Redirect student to learning materials.

* For some misconceptions (eg. “Heat is a substance.”), we only have 2 questions. Dr Gao will discuss with Hongmei regarding designing and providing more questions.
* Student should be provided first with items with least number of misunderstandings and then items with higher number of misunderstanding levels.
* Adaptive Phys : System Design + Algorithm

Padmaja to focus on system design part.