Assessment of Question Quality using Bloom's Taxonomy

Domain: *ML and NLP in Education*

Batch PW023

Members

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Guides

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Synopsis

- Assess the quality of questions by classifying them according to Bloom's Taxonomy
- Ascertain the type and amount of knowledge and skill required to answer a question
- Knowledge and skill are quantified in different levels in Bloom's matrix, and our goal would be to build a classifier which can classify questions according to these levels.

Background: Bloom's Taxonomy

- A hierarchical model which classifies educational learning objectives into different levels of complexity and specificity

- Multiple versions have been developed; the most generic model, and the one we are considering for our project is given below

Knowledge Dimension	Cognitive Process Dimension					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

- Published by Benjamin Bloom in 1956; revised by Anderson and Krathwohl in 2001

Motivation (1)

- Currently, there exists no tool in the open source community that assesses question quality according to Bloom's Matrix

- This topic has been explored before *(*Ref: Bhargav HS, Akalwadi, Pujari et al*; Application of Bloom's Taxonomy in day to day Examinations)* , but the implementation that currently exists uses just one dimension.

- A successful implementation of this system will serve as a useful pedagogic tool with a myriad of use cases, such as
    1. ***Assess lecture delivery quality***; analyse students' doubts after a lecture

    2. ***Weighted GPA system***; apply weightage to subject grade by analysing question papers set for that subject

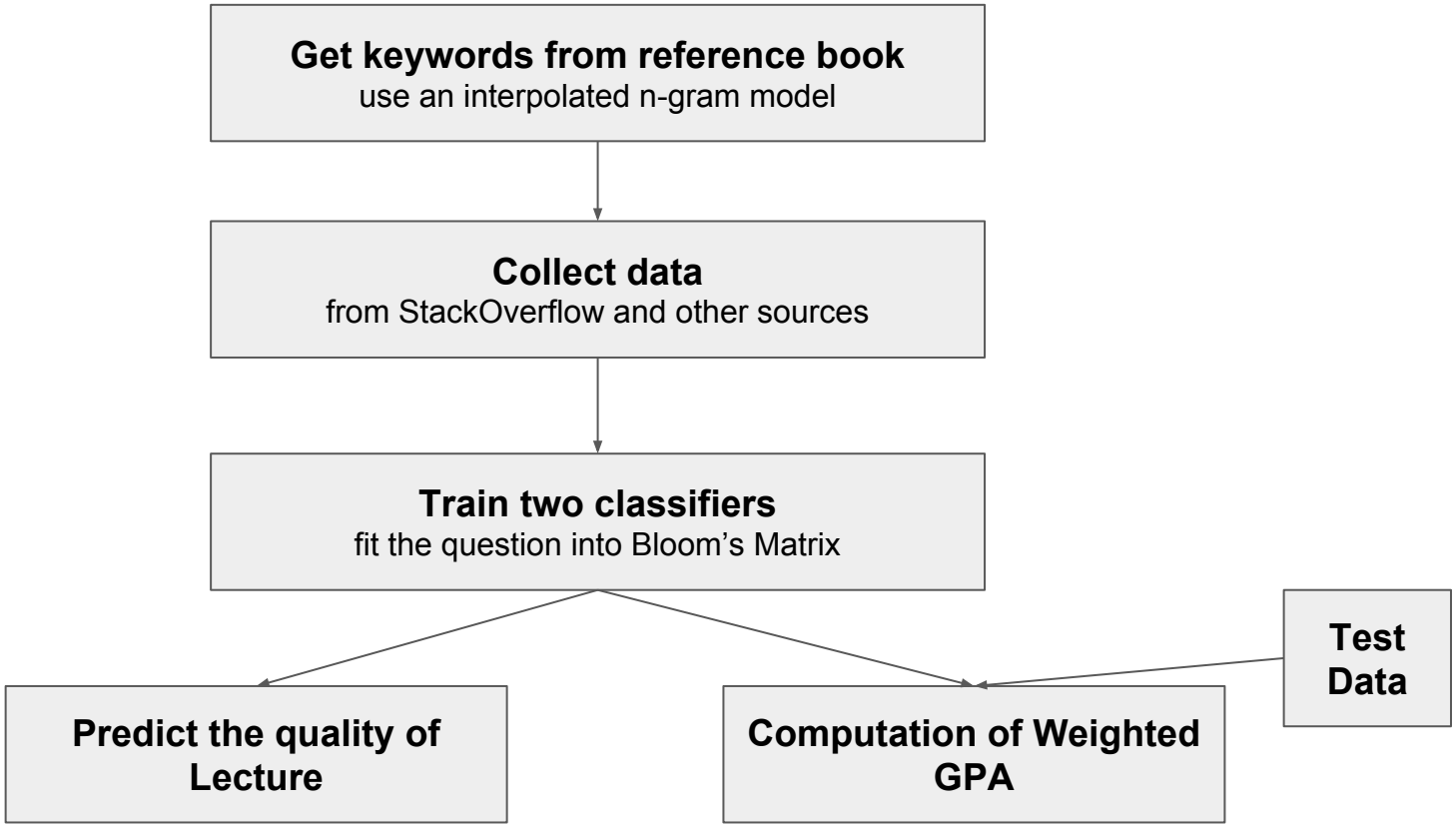
Motivation (2)

The main benefactors of this system would be:

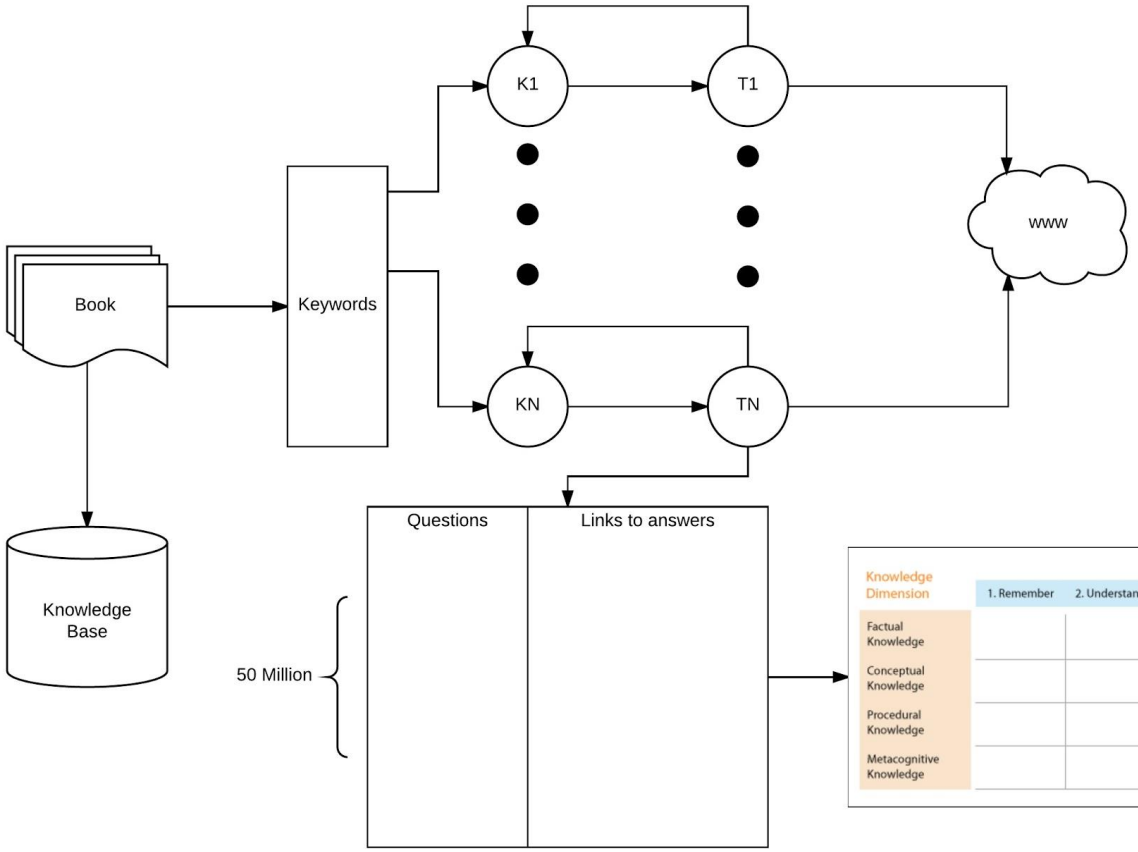
- **Teachers**
  Would help teachers better understand what topics students have understood, and where they require clarification

- **Students**
  - Provide a true indicator of a student's abilities regardless of the courses they have taken
  - A student in PES knows how they compare to a student in RV (provided same grading system)
    .
- **Companies and Recruiters**
  Assess interviewees fairly with a uniform evaluation matrix

System Design (1)



System Design (2)



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Plan of Action

- Thus far, we have explored a data mining tool called **Orange.** This tool makes it very easy to build arbitrarily complex data workflows to carry out data mining and analysis
- Get a LOT of data, which requires the question aggregator subsystem detailed in the previous slide
- Build two classifiers in parallel as part of our POC:
  - One for classification in the knowledge domain
  - The other for classification in the cognition domain
- Validate our system by applying them in the use cases mentioned earlier

Thank you!