

**THE BEANSTALK – A STUDY IN DATA AND ANALYSIS**

**Dr.K.Vijayalakshmi**, Department of Mathematics,  
**Varalakshmi Ainala**, Computer Science and Cognitive Systems  
Loyola Academy , Secunderabad, Telangana India  
[varalaxmi.ainala@gmail.com](mailto:varalaxmi.ainala@gmail.com), [vijalayola@gmail.com](mailto:vijalayola@gmail.com)

**Abstract**

The aim of this paper is to demonstrate the learnings found during the development of the web-app “*The Beanstalk*”. The Beanstalk is a tool which can be used by students to prepare for any test by evolving alongside the student. The web-app analyses the student’s performance in each test he/she appears and based on criteria such as time taken to solve individual questions, number of hints taken, whether the answer is correct or not, etc. to generate the next set of questions which would help the student achieve mastery over the domains he/she want to. The Beanstalk utilizes a rich and comprehensive data set to make this all possible.

**Keywords:** Analyze, tests, evolving, performance, comprehensive, data set, Beanstalk, development, web-app, generate question paper, mastery, questions.

**Introduction**

Students nowadays are utilizing the internet and all the resources it provides to improve their studies to score better in their exams. But they may get stuck in the infinite pool of knowledge the internet provides and they are constantly switching tabs to find that single piece of information which may or may not be of their use. They also are surrounded by choices of various education aid websites for practice tests and question banks. The institution may not provide the students with the necessary resources which they “should” have.

Here comes the beanstalk, as it provides a single solution for all these problems. The beanstalk comes with a rich and comprehensive set of question banks and a test system which adapts uniquely to each student. Educational institutions can incorporate The Beanstalk in their eco system providing their students the aid they deserve.

**Technologies Utilized**

For the development of the web-app, some knowledge about full stack development was required. The Beanstalk is built upon the Flask web framework, the main website was built using HTML, CSS, JavaScript. For the database, responsible for the comprehensive data set, SQLite was used.

**The Test Algorithm**

The highlight of the beanstalk is its test system, which adapts to each student individually by analyzing the way they attempt the tests. In the current iteration of the algorithm, the system analyses the time taken, number of hints taken and whether the answer is correct or not for individual questions. To generate the new question paper certain labels were made

- MO (move on)
- RSQ (Repeat Same Question)
- RST (Repeat Same Type)

The questions have different attributes to which these labels are given according to the recorded observations by the students’ latest attempt at the question paper. Then the labels for a question are combined into a final verdict for that question with the same labels (to maintain simplicity) and with that we have a final verdict for each question from the previous question paper.

**The Database**

SQL tables are used as the source of data for the algorithm to fetch and update. The tables used are namely:

- OBSERVED: this table contains the data when the user attempts a question paper. The

columns for this table are user\_id, question\_id, n\_hints, q\_time, sk\_lvl, user\_answer. This table gets updated entirely every time the user attempts a question paper.

-PROCESSED\_DATA: this table contains data which has gone through the main algorithm and a verdict for each question is stored in this. The columns for this table are user\_id, question\_id, Hint\_obs, Time\_obs, Answer\_obs, sk\_lvl. This table stores the verdict of each attribute for the questions. And then the data from this table is put in the question paper generation algorithm which gives each question a final verdict and based on that a question is added to the new question paper.

-USER\_ANALYSIS: In this table the main details of each question paper attempt is stored. The columns for this table are user\_id, T\_HINT\_M, T\_TIME\_M, T\_ANSWER\_M, TOTAL\_M. The attributes for each question in the question paper are converted into a generalized mark format and stored in this table. This table is used for displaying statistical information for the students' growth through the attempts.

-QUESTION\_BANK: this table contains all the questions from which the question papers will be generated. The columns for this table are Q\_ID, SUB\_ID, SK\_LVL, QUESTION, OP\_1, OP\_2, OP\_3, OP\_4, HINT\_1, HINT\_2, ANSWER.

-USER: this table is used to store user information as for each individual user will have different configurations for The Beanstalk. The columns for this table are USER\_ID, EMAIL, PASSWORD, FIRST\_NAME, LAST\_NAME, PH\_NO, CONFIG\_ID.

### **Generating The New Question Paper.**

Now, since each question has a final verdict, we generate a new question as follows If verdict is:

-MO (move on): Then we remove that question and replace with another question of higher skill level.

-RSQ (Repeat Same Question): As the name suggests, we add this question again to the next question paper.

-RST (Repeat Same Type): In this, we remove the question and replace with another question of same skill level and topic.

By doing so, we create the new question paper which will help the student tackle the problems head on and overcome them. This way the student is also able to focus on the questions which really matter and complete all topics at their pace.



### **The Importance of Data.**

Analysis is the classification of information based on some decisions, while data is nothing more than information. A crucial function of The Beanstalk is to analyze data, classify it according to parameters, and present it to the user. An extensive database would have been the ideal way to develop the algorithm, but time constraints and a lack of resources prevented that. Thus, the bugs and errors due to lack of data were a substantial hindrance.

Data is critical in the world of Computer Science, and without data, it is impossible to prove something, make decisions, do work, and accomplish goals.

While working on The Beanstalk, the proper management of data was important utilizing a database management system; SQLITE was used as the database management tool and python was used for analysis of data while developing The Beanstalk.

### **Conclusion**

Practical knowledge can often lead to a deeper understanding of a concept through the act of personal experience. That is precisely how the importance of data was understood while working on the analysis algorithm for The Beanstalk. Reading about data from various sources would not have resulted in the same depth of research as fixing the algorithm's myriad of errors. And through that learning it is found that with properly managed data, any work be it analysis, computation, presentation etc. can be optimized for maximum efficiency and accuracy. As a result, the finest possible version of the algorithm, software etc. is made.

### **References**

[https://en.wikipedia.org/wiki/Data\\_\(computing\)](https://en.wikipedia.org/wiki/Data_(computing))

<https://www.techtarget.com/searchdatamanagement/definition/data>