Automated Assistance for Syllabus Understanding and Making (AASUM) Tool

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Abstract— Syllabus plays an important role in various courses of study during higher technical education. AASUM is a tool designed to assist syllabus makers in framing the syllabus. It emphasizes the characteristics and potentials that need to be considered during the design of a course syllabus in order to make the syllabus effective and useful. Syllabus makers can use AASUM while designing the syllabus of a new course. AASUM displays the needed details from different universities and educational institutions, which are already offering similar courses. The objective of this paper is to describe the development and utilization of AASUM tool along with an example. This tool is python based tool containing forms and reports. Faculty can input their Syllabus needs by using the Forms. AASUM maintains a syllabus base containing information about different courses offered by various universities. AASUM generates useful reports with hyperlinks leading to the useful information towards framing the syllabus.

Index Terms — Hyperlinks, Syllabus, Python, COs(Course Outcomes), POs(Program Outcomes), ERD(Entity Relationship Diagram), Widgets

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I. INTRODUCTION

As per definition, A syllabus (pl. syllabuses or syllabi) is an outline and summary of topics to be covered in an education or training course[1].The term 'syllabus' originates from the Greek word 'syllibos'. Its etymology suggests a "label" or "table of contents". The outlines of a course syllabus are usually indicated by an academic board, or by an examination board. The detailed syllabus is usually prepared by a group of senior faculty who supervises and controls the course curricula and course quality. Syllabus usually contains a list of topics, one or more preferred text books, list of reference books and other information necessary for completion of the course.

The syllabus ensures a fair and impartial understanding between the students and faculty such that there is minimal confusion on topics relating to the course, setting clear expectations of material to be discussed in the classroom, and guiding the effort on student's behalf to be put into the course, providing a roadmap of course organization/direction relaying the instructor's teaching philosophy to the students, and indicating a marketing angle of the course such that students may choose the course depending upon the subject material is attractive or not[1].

A syllabus, thus, is a promise to the students that they would be taught the mentioned topics and in the specified order, and the requirement of which if they satisfy, would be given a reward that leads to a degree/diploma/certificate with the specified pattern of grading/marking. Syllabus resembles a contract between students and faculty, and also to an extent between students and the University/Institution. Faculties are bound to cover the topics as mentioned in the syllabus and the students have to learn those for their evaluation and completion of the course. The University/Institution is under obligation to award degree/diploma students on successful completion of all criteria. A syllabus has to cater to multiple issues and factors. Apart from topics required to cover, syllabus also mentions other important information such as text books, reference books, time frame for completion of the course of study, pattern of evaluation/examination, and distribution of marks per individual unit.

The major components of a good syllabus are as follows:

- Complete Course Title
- Course Description
- Introductory information
- Topics
- Course prerequisite(s)
- Course Outcomes (COs)
- Mapping of COs to Program Outcomes
- Text Books

- Reference Books and material
- Course delivery methods
- Attendance Requirement
- Withdrawal policy / Reinstatement policy:
- Student Responsibilities
- Evaluation/Examination
- Final grade options

A good syllabus is prima facie evidence that indicates the essential effort needed to create a good course. A good syllabus is a resource for students and serves a variety of purposes. It lays out itinerary for the semester/course, and is a student's first reference. It gives students a clear sense of the disciplinary lay out of the course and assists students in pursuing relevant topics.

Following are the primary advantages of syllabus:

- Offer students a clear and concise statement about a particular course;
- Indicate students how they would be taught the material and why;
- Provide logistic information about the course;
- Explain exactly what is required of the students;
- Guiding the students to the sources of appropriate information.

II. ROLE OF AASUM TOOL IN SYLLABUS FRAMING

Syllabus makers usually refer to the web sites of popular universities/institutions while framing the syllabus of a given course. They spend a lot of time, by going through the relevant information on the web manually. This need considerable amount of search effort, as all the universities/institutions, may not be providing the needed course. Also, they need to remember or at least store hyperlinks of various web pages providing the information on the course, for comparison purpose. All such manual effort can be reduced by using AASUM. AASUM also helps in minimizing the time needed for framing the syllabus, as the syllabus makers need not go through the web pages that are not containing the relevant information.

AASUM provides the following functionalities to ease the syllabus framing process.
- Accept the name/abbreviation of the needed course, for which the syllabus is to be framed, as input.
- Process the above input, and do an automated search to identify the universities/institutions offering similar course.
- Produce report containing the details of identified universities/institutions along with hyperlinks.

III. SYLLABUS BASE OF AASUM

The syllabus base of AASUM contains the University, Course and Link entities. The University entity comprises of: UID (University ID),Name of the university, Department and course name attributes. The course entity consists of course name and course abbreviation. The link entity contains UID and the hyperlink.

Following is the ERD (Entity Relationship Diagram) that shows the relationship between entities used in AASUM.
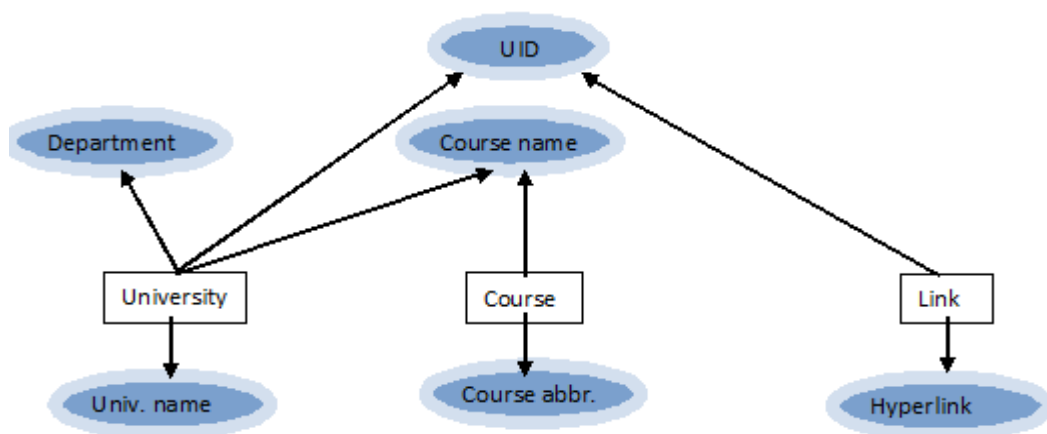

Fig1. Entity Relationship Diagram of AASUM

IV. INPUT FORM OF AASUM

The input form of AASUM is used to get name of the course, for which the syllabus is to be framed, as input. This Form is designed by using PyQt and Pyuic. PyQt is a Python binding of the cross-platform GUI toolkit. It is one of Python's options for GUI programming. The input form layout is designed by PyQt.

PyQt implements around 440 classes and over 6,000 functions and methods as follows.[5]

- Classes in windows for embedding ActiveX controls
- A set of GUI widgets classes for accessing SQL databases (MySQL,ODBC, PostgreSQL, Oracle)[4]
- QScintilla, Scintilla-based widget for rich text editing
- Data aware widgets that are automatically populated from a database
- An XML parser
- SVG(Scalable Vector Graphics) support

PyQt contains the following Python modules [5].

- The QtCore module consists of the core non-GUI classes, including the event loop and signal and slot mechanism. It also comprises platform independent abstractions for Unicode, threads, mapped files, regular expressions, shared memory and user and application settings.
- The QtGui module contains the majority of the GUI classes. These include a number of list, tree and table classes based on the model view controller design pattern. Also provided is a sophisticated two dimensional canvas widget capable of storing thousands of items including ordinary widgets.
- The QtNetwork module contains classes for writing TCP and UDP clients and servers. It includes classes that implement HTTP and FTP clients and support DNS lookups. Network events are integrated with the event loop making it very easy to develop networked applications.
- The QtOpenGL module contains classes that enable the use of OpenGL in rendering three dimensional graphics in PyQt applications.
- The QtSql module contains classes that integrate with open-source and proprietary SQL databases. It includes editable data models for database tables that can be used with GUI classes. It also includes an implementation of SQLite.
- The QtSvg module contains classes for displaying the contents of SVG files. It supports the static features of SVG 1.2 Tiny.
- The QtXml module implements DOM and SAX interfaces to Qt's XML parser.
- The QtMultimedia module implements low-level multimedia functionality. Application developers would normally use the phonon module.
- The QtDesigner module contains classes that allow Qt Designer to be extended using PyQt.
- The Qt module consolidates the classes contained in all of the modules described above into a single module.
- The uic module implements support for handling the XML files created by Qt Designer that describe the whole or part of a graphical user interface. It includes classes that load an XML file and render it directly, and classes that generate Python code from an XML file for later execution.[6]

The input form can accept a course comprising of 128 chars(maximum). Also ,it can accept the abbreviated form of the course name through an optional field. The form has four push buttons: Abbr.search, Full length search, Word search and Generate Report Buttons.

- The 'Abbr.search' button is used to do the course search using the abbreviated from of the course. This search based on abbreviations will be quick enough, but it may not give accurate results, as two or more courses can have the same abbreviated form. For instance, STM may stand for 'Software Testing Methodologies' as well as ' Safety Technology Management'.
- The 'Full length search button' is used to perform the search, by using the full course name. This search produces accurate results. However, this search may fail, even when there is a little deviation in the course names. For example the course entitled 'Software Testing Methodologies' is simply termed as 'Software Testing' in some universities.
- The 'Word search button' is used to perform the search using the words in the course name. This reduces the user input word by word and performs the search recursively until no more words are left in the input string. The words are removed from the backend of the input string, to make the search more effective.
- The 'Generate Report button' is used to generate the output report with hyperlinks. This hyperlink can be directly used to access the website of the university/institution, offering the needed course.

Pyuic is used to generate the python program for the input form layout created by using the PyQt Designer.

Following is the input form of AASUM.

Fig-2: AASUM Input Form

V. RESULTS ANALYSIS

Following is the part of the report generated, when a 'Full length search' is performed by using the search string 'Software Testing Methodology'

Fig-3:Part of the Report Generated

Following figure shows the department wise accuracy of the search, when the search is conducted with the courses of four departments viz., Aeronautical, Computer Science, Electronics & Mechanical, on a sample size of 45 per department.
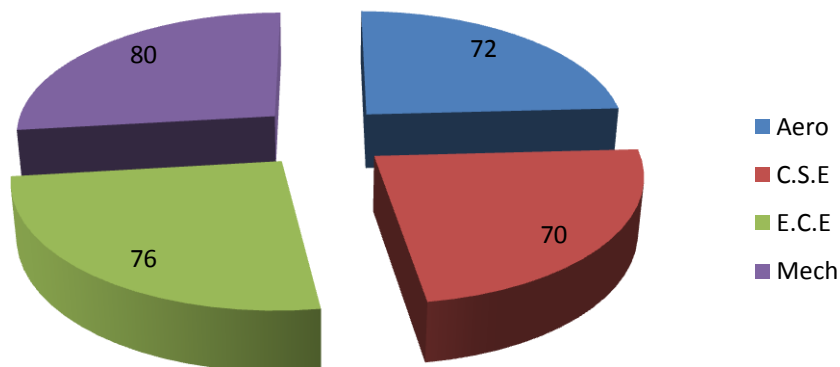

Fig-4:Department wise accuracy of the search, in terms of percentages

Following Figure depicts the button wise accuracy of the search with a sample size of 40. This study clearly shows that the 'full length search' has a clear edge over the remaining.
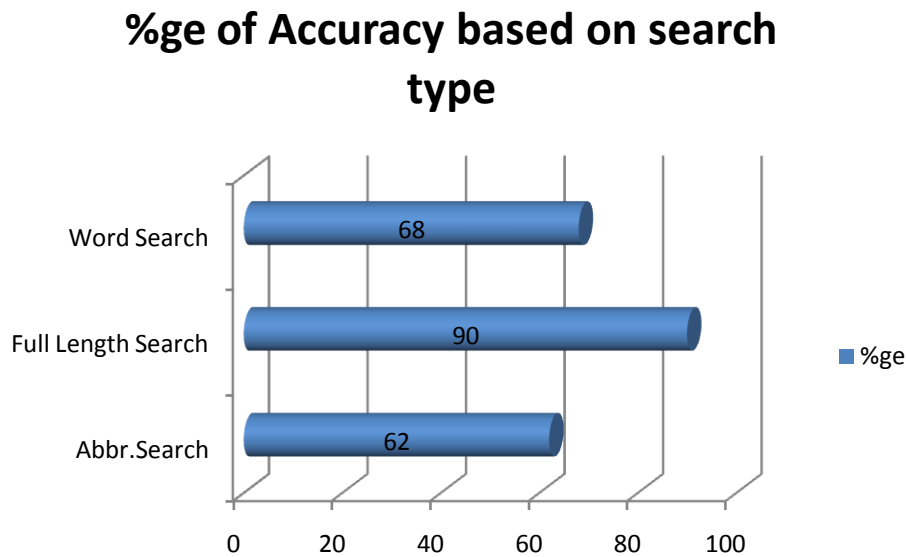
%ge of Accuracy based on search type

Fig-5:Abbreviated search vs. Full length search vs. Word wise search

VI. CONCLUSION

The analysis of results clearly shows that the 'Full length search' feature of the AASUM tool is quite useful in accessing the websites of relevant universities/institutions containing the needed course. The ' word wise search' can be further improved by using different combination of words during the search. Nothing much can be done to improve the 'Abbreviated Search' as two or more courses can have the same abbreviated form.

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