International Journal of Research Studies in Science, Engineering and Technology
Volume 2, Issue 7, July 2015, PP 147-158
ISSN 2349-4751 (Print) & ISSN 2349-476X (Online)

Uni-Search - A Web Crawler for Career Matching and University of Choice Detection

Kayima John Paul[1], Kivisi Samuel Ngoda[2], Shibwabo Bernard Kasamani[3]

Faculty of Information Technology, Strathmore University, Nairobi, Kenya
[1]*kayimajohn@gmail.com*, [2]*ngodasamuel@gmail.com*, [3]*bshibwabo@strathmore.edu*

Abstract: *Many of the youth around the world are not certain of what career to pursue for one reason or another. Unfortunately at the moment, several youth tend to pursue the "cool" courses without regard to their capabilities, passions and interests. Uni-Search is an intelligent application meant to create awareness about choosing the ideal route to a career or profession. Given ones' capabilities or strengths, the application establishes your personality then matches the possible career options proper to ones' capabilities. This is achieved by crawling the web with efficient matching algorithms. With the results, a user is then at freedom to select among the options given which one best defines what you want to do for a career. A user can then select among the courses and read about what each one of them entails before narrowing down to one. Uni-Search also provides information on which Universities offer the chosen course and their location. This helps to a large extent counter the issue of youth unawareness about what career path to undertake and what course to pursue.*

Keywords: *Pattern Matching, Search, Web Crawling, University Search, Career Focus.*

1. INTRODUCTION

It is common to notice that every human is unique and has got a talent proper to that person. Some people are living off their talents; some are yet to even ascertain whether they do possess any talent. Talents are often nurtured as one goes through school especially with a good education system i.e. through school one is able to learn, understand and appreciate the knowledge attained and later be able to apply this in form of a career or profession. The learning process differentiates individuals in terms of their capabilities and preferences and henceforth gives rise to the profession of choice for an individual.

There is a likelihood that youth may be aware of the career paths they want to undertake but not so certain of the subjects or course to pursue at University or higher institutions of learning and therefore, they end up doing whatever course sounds close to leading them to their dream job. Others may not even be aware of the exact career-path they are capable of, let alone the course to pursue.

With Uni-Search the goal is to seek to bridge this information gap by providing awareness/ information that enables, on identification of their personality, interests and subjects done. One should therefore be able to know what course would best lead them to their dream job and also possible Universities where one can undertake the course.

In a generic setting, virtually all careers have their subject combination requirements, personality characteristics and personal interests that are supposed to be fully assessed before individuals can be deemed qualified for them. It has to be stressed that every individual is unique. No person is exactly the same as the other including identical twins. There exist differences which affect all aspects of the individual's life which can be attributed to hereditary, environmental factors, background etc. The problem of individual differences was what prompted psychologists of the old to find out whether personalities are of various types. In fact, these theories came up with different classifications of personality types. Holland's theory has six personality types as compared to those of Sheldon and Allport. It may be necessary therefore to examine Holland's grouping of personality types. Holland contended that people are most productive when there is a good fit between their personality types and their career. He proposed six personality types and these are as follows [1]:

- The Realistic personality type possesses manual skills but is aggressive and unsociable. Farming, Forestry, Engineering and Architecture are examples of careers this personality type can fit into.
- The Investigative personality makes extensive use of his intelligence. Thus, he is always thinking, organizing ideas and trying to understand things. Medicine, Geology, Mathematics and Physics fit very well into this occupational environment.

- The social personality type who detests physical activities is endowed with skills for inter-personal relationship. He is friendly, caring and enjoys imparting knowledge to others. Environments that match this personality type are Foreign Service, Social Welfare, Lecturing and Guidance and Counselling.
- The Artistic personality type is highly interested in creative activities where he can express his emotions. Thus, he prefers individual work to group work. Occupational environment where this personality can strive well are Fine Art, Music, Mass Communication and Theatre Arts.
- The Enterprising personality type possesses verbal skills with which he influences others and also obtains power and status. Examples of occupational environments where this personality type can thrive well are Law, Catering, Political Science, Public Administration and Estate Management.
- The Conventional personality type is opposed to change: He is rule-regulated and enjoys ordered and systematic activities. Environments that match this type of personality are Accounting, banking, Library Science and Secretarial Work.

Many of the youth these days around the world are not certain of what career to pursue for one reason or another [2]. Sometimes people do courses at the university and then end up stranded after graduation because they are not sure of what career-pertain to the course done. Some are fortunate enough to have a vision, capability and focus to achieve their childhood career dreams. A smaller percentage of kids are bright enough to excel in the subjects or course units required for their childhood dream professions.

Other kids are also fortunate enough to have parents who involve them in their profession so they can learn and understand how work is done. This kind; have an upper hand over those who are not as fortunate. Then, there are the not so fortunate kinds who may have a vision but it fades away as they progress through school for one reason or another; maybe they are not excelling at some particular subjects or their career dreams seem to change as life goes on.

A study results shows that 70% of the subjects had personality types that were congruent with their career choice. This led to frustration, detrimental performance and bad attitude towards a career [3]. According to a research by Dickson and Anna, while students are making career choices they aspire most to Medicine, Accounting, Law, Pharmacy and Engineering in descending order of preference mainly because of their high economic rewards, social value and high prestige. [2] In his article states that 70% of the students in Harvard and other colleges in Europe make course switches at least once in their university or college education.

There is need to apply the existing technologies to address the discussed challenges. One way to address them is to develop an application that can be used to establish suitable career-paths to undertake, course to pursue in light of chosen career-path and which University in the selected locality offers chosen course/s, given one's personality, subjects done and interests.

2. Review of Related Literature

2.1. Application Design and Usability

Tasks that involve a lot of complex knowledge can more conveniently and accurately be met by systems that are able to support complex knowledge use. A high degree of function must thereby be built into these systems that gives a degree of intelligence to the system. Intelligent systems are not databases; they are systems that are able to learn from knowledge stored in them and better yet, they can teach themselves.

Designing intelligent systems is indeed a task. Especially for the amount of data intelligent systems demand in order to build their knowledge. In this case it is even more trivial, everyone is different and our users don't have the same profile or personality. Users come from different locations, different cultures and each is expected to receive the same quality and type of service from the other. This stresses why a usable design is very important for the application. Intelligent and knowledge based systems end up being unusable to the end user [4].

Getting the navigation right is one of the most important aspects of design. Navigation is the framework within which screens, interaction, and the visual appearance are designed. The most basic axiom of usability is that one should make interaction with the software as easy as possible, allowing

users to focus on the tasks that brought them to the software in the first place. To the extent that navigation is confusing and requires the user's attention to figure it out, usability will suffer [5].

In order to minimize the cognitive load and shorten the learning curve, this research addressed this by creating a story line type of navigation where there is a build up from previous input and stages to create new ones that are directly related. The user can then piece up these interfaces together.

2.2. Personality Types and Careers

Certain Personality types are more suitable for certain career opportunities, how we get along and don't get along with other people; whether we show up on time for meetings or we frequently show up late; whether we wait till the last minute to start a project, or we start well before a deadline; whether we are detail oriented or big picture oriented and strategic [6].

A majority of students choose the wrong career paths, which do not match their personalities. On the conventional personality type, majority of students (38) out of 45 choose careers that do not match their personality type [3]. Table 1 shows how careers and personalities match.

Table1. *Personality Types by Choice (Adapted from [3])*

Personality Types	Right Career	Wrong Career	Total	$\chi 2$	Contingency Coefficient	Critical R
Realistic	2219	1619	3838	0.94	0.15	0.30
Investigative	4139	3739	7878	0.20	0.05	0.22
Artistic	522.5	4022.5	4545	27.2	0.61*	0.29
Social	24165.5	307165.5	331331	241.96	0.65*	0.20
Enterprises	2239.5	5739.5	7979	15.5	0.40*	0.22
Conventional	722.5	3822.5	4545	21.34	0.57*	0.29

According to [7], the decision made by the students or any person to a career choice are influenced by incorporating direct pathways between person inputs and choice goals, and between person inputs and choice actions. Figure 1 presents the 5-factor model of personality which is used to operationalize person inputs, and career planning and career exploration is used to operationalize choice actions.

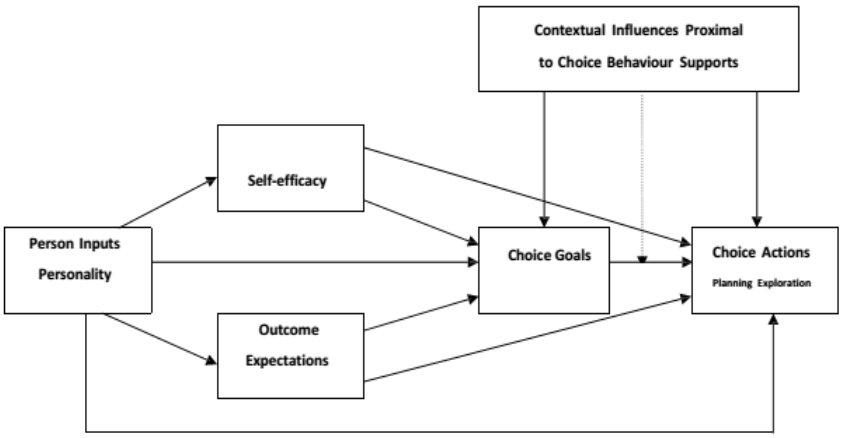


Fig1. *Proposed paths; from person and contextual inputs, to career planning and exploration Adapted from [7]*

2.3. Implementation of Personality Diagnosis algorithm

Personality Diagnosis (PD) algorithm is a collaborative information filtering algorithm that was proposed earlier in checking personality. It is a pretty accurate algorithm and in terms of required inputs and outputs, PD is interchangeable with Correlation, which is another popular collaborative information filtering algorithm. As a matter of fact, Altered Vista, educational web resource recommender system also uses Correlation. The proposed solution made use of the model based personality diagnosis algorithm [8].

For each user in the dataset, calculate the probability that the active user is this user, given their respective rating vectors. Multiply that probability by the probability that the active user will rate the item under consideration as one of the available ratings, given what the comparison user rated the item. Sum that together over all users, and take the rating with the highest probability as the predicted rating for the active user on the item. This is illustrated in equation 1.

$$\underset{h=1,\ldots,5}{Max} \sum_{i=1}^{n} Pr(r_a(j) = h | r_i(j) = y) \cdot Pr(a^{true} = i | R_a, R_i) \quad (1)$$

Where h is a possible rating, n is the number of users, $r_a(j)$ is the rating of the active user on item j, and R_a is the rating vector for the active user.

This is implemented with equation 2 as follows, where the above notation holds, with the additional caveats that attributes common to two users are numbered from l to m, and little sigma is a parameter.

$$\underset{h=1,\ldots,5}{Max} \frac{1}{n} \sum_{i=1}^{n} (e^{-(h-r_i(j))^2/2\sigma^2}) \prod_{l=1}^{m} (e^{-(r_a(l)-r_i(l))^2/2\sigma^2}) \quad (2)$$

Adapted from [8]

2.4. Search Engines and How they Work

Programming a search engine is a relatively challenging task. Search engines index tens to hundreds of millions of web pages involving a comparable number of distinct terms. They answer tens of millions of queries every day. Despite the importance of large-scale search engines on the web, very little academic research has been conducted on them. Furthermore, due to rapid advance in technology and web proliferation, creating a web search engine today is very different from three years ago. There are differences in the ways various search engines work, but they all perform three basic tasks:

- They search the Internet or select pieces of the Internet based on important words.
- They keep an index of the words they find, and where they find them.
- They allow users to look for words or combinations of words found in that index.

A search engine finds information for its database by accepting listings sent in by authors who want exposure, or by getting the information from their "web crawlers," "spiders," or "robots," programs that roam the Internet storing links to and information about each page they visit. A web crawler is a program that downloads and stores Web pages, often for a Web search engine. A crawler starts off by placing an initial set of URLs, S0, in a queue, where all URLs to be retrieved are kept and prioritized. From this queue, the crawler gets a URL, downloads the page, extracts any URLs in the downloaded page, and puts the new URLs in the queue. This process is repeated until the crawler decides to stop. Collected pages are later used for other applications, such as a web search engine or a Web cache.

The most important measure for a search engine is the search performance, quality of the results and ability to crawl, and index the web efficiently. The primary goal is to provide high quality search results over a rapidly growing World Wide Web. Some of the efficient and recommended search engines are Google, Yahoo, ask.com and Teoma, which share some common features and are standardized to some extent [9]. Figure 2 shows the Architecture of Search Engines.

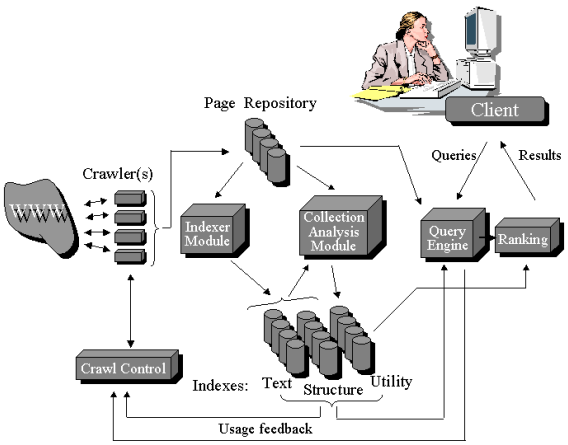


Fig2. *The Architecture of Search Engines Adapted from [10].*

Given the enormous size and the change rate of the Web, many issues arise, including the following:

- What pages exactly should the crawler download?

- How should the crawler refresh pages?
- How should the load on the visited Web sites be minimized?
- How should the crawling process be parallelized?
- Categorizing and segmenting data

2.5. Education Schema Meta Tags

In order to crawl the web with a bias to Universities, there is need to comprehend the Education Schema Meta Tags. This is presented in Table 2.

Table2. *Education Schema Meta Tags (Adapted from [11])*

Property	Expected Type	Description
Properties from Educational Organization		
alumni	Person	Alumni of educational organization. Inverse property: alumni Of.
Properties from Organization		
address	Postal Address	Physical address of the item.
aggregate Rating	Aggregate Rating	The overall rating, based on a collection of reviews or ratings, of the item.
brand	Brand or Organization	The brand(s) associated with a product or service, or the brand(s) maintained by an organization or business person.
contactPoint	ContactPoint	A contact point for a person or organization. Supercedes contact Points.
department	Organization	A relationship between an organization and a department of that organization, also described as an organization (allowing different urls, logos, opening hours). For example: a store with a pharmacy, or a bakery with a cafe.
dissolution Date	Date	The date that this organization was dissolved.
duns	Text	The Dun & Bradstreet DUNS number for identifying an organization or business person.
email	Text	Email address.
employee	Person	Someone working for this organization. Supercedes employees.
event	Event	Upcoming or past event associated with this place or organization. Supercedes events.
fax Number	Text	The fax number.
founder	Person	A person who founded this organization. Supercedes founders.
founding Date	Date	The date that this organization was founded.
global Location Number	Text	The Global Location Number (GLN, sometimes also referred to as International Location Number or ILN) of the respective organization, person, or place. The GLN is a 13-digit number used to identify parties and physical locations.
has POS	Place	Points-of-Sales operated by the organization or person.
interaction Count	Text	A count of a specific user interactions with this item—for example, 20 User Likes, 5 User Comments, or 300 User Downloads. The user interaction type should be one of the sub types of User Interaction.
isicV4	Text	The International Standard of Industrial Classification of All Economic Activities (ISIC), Revision 4 code for a particular organization, business person, or place.
legal Name	Text	The official name of the organization, e.g. the registered company name.
location	Postal Address or Place	The location of the event, organization or action.
logo	URL or Image Object	A logo associated with an organization.
makes Offer	Offer	A pointer to products or services offered by the organization or person.
member	Organization or Person	A member of an Organization or a Program Membership. Organizations can be members of organizations; Program Membership is typically for individuals. Supercedes members. Inverse property: member Of.
member Of	Organization or Program Membership	An Organization (or Program Membership) to which this Person or Organization belongs. Inverse property: member.

naics	Text	The North American Industry Classification System (NAICS) code for a particular organization or business person.
owns	Product or Ownership Info	Products owned by the organization or person.
review	Review	A review of the item. Supercedes reviews.
seeks	Demand	A pointer to products or services sought by the organization or person (demand).
sub Organization	Organization	A relationship between two organizations where the first includes the second, e.g., as a subsidiary. See also: the more specific 'department' property.
tax ID	Text	The Tax / Fiscal ID of the organization or person, e.g. the TIN in the US or the CIF/NIF in Spain.
telephone	Text	The telephone number.
vat ID	Text	The Value-added Tax ID of the organization or person.
Properties from Thing		
additional Type	URL	An additional type for the item, typically used for adding more specific types from external vocabularies in microdata syntax. This is a relationship between something and a class that the thing is in. In RDFa syntax, it is better to use the native RDFa syntax - the 'typeof' attribute - for multiple types. Schema.org tools may have only weaker understanding of extra types, in particular those defined externally.
alternate Name	Text	An alias for the item.
description	Text	A short description of the item.
image	URL or Image Object	URL of an image of the item.
name	Text	The name of the item.
potential Action	Action	Indicates a potential Action, which describes an idealized action in which this thing would play an 'object' role.
sameAs	URL	URL of a reference Web page that unambiguously indicates the item's identity. E.g. the URL of the item's Wikipedia page, Freebase page, or official website.
url	URL	URL of the item.

3. The Proposed Web Crawler for Career Matching and University of Choice Detection

3.1. The Way Forward

In order to develop the proposed solution, a high quality object oriented application object-oriented analysis and design methodology was applied. In an object oriented analysis and design complex software system can be broken down into various objects, combining the data and the functions that operate on the data into a single unit, the object. This form of object decomposition provides a natural way of breaking the problem down into isolated, manageable parts. In many cases, the development effort shifts from writing a new code, to assembling existing objects in new and innovative ways to solve a problem. Thus, object-oriented analysis and design methodology cuts down development time and costs, leading to faster time to market and significant competitive advantage, and enables producing more flexible, modifiable, easily maintainable object-oriented systems [12].

Uni-Search is an information manipulation and analysis system that is intelligent. The amount of data involved in the working of this system is enormous thus it needs to summarise this data so as to remain user-friendly and give relevant results.

3.2. Analysis and Design

3.2.1. Functional Requirements

- Personality test analysis i.e. return results of personality questions answered by user
- Provide a list of common activities that interest people
- Provide a list subjects offered in Kenyan high schools
- Display possible career options given ones' interest, personality and subjects done
- Display a list of courses best suited for chosen career-path
- Display Universities offering selected course e.g. in Kenya and their location

3.2.2. Non-functional Requirements

- The application has an easy navigable User Interface to enable optimum usage. The user is able to move from registration through till University selection with ease.
- The information provided by the application (subjects, courses, interests, careers and universities) has been researched about prior to adding to the database thus, accurate and reliable.
- The application is easily extensible i.e. it easily adds Universities crawled from the Internet to the database.
- Application performance is reasonably fast to foster easy navigation and optimum usage

3.2.3. System Description

The users of this system are of three kinds: the student and the administrator. On logging in or registration for a new user, the student and the administrator are directed to different pages that support different functionalities.

The student home page or dashboard consist of the personality test, that the student will have to take if they are not certain of their personality type. After this, the student proceeds to the Academics page that contains subjects done in Kenyan High Schools. Here, the student is required to select subjects done plus the grade they got for each selected subject. The student can then go to the interest's page where they can choose one or many fields they are interested in. This section has been named as the students profile i.e. subjects done, personality type and interests.

After the creating their profile, the student is directed to the career-path page where, based on interests chosen, personality and subjects done, the systems then displays suitable career with a percentage indicating capability i.e. the higher the percentage, the greater the capability for the career. On selecting a career, the student then proceeds to the courses page where courses pertaining to selected career are displayed. Clicking a course directs the student to the universities page that displays universities e.g. in Kenya where selected course is offered. The student can further click on a university to find out its description for example, its location and address.

The administrator dashboard consists of icons for subjects, courses, interests and personalities, clicking on which, the administrator can add a subject, course, interest or personality type. Figure 3 presents the entire use case diagram for the system.

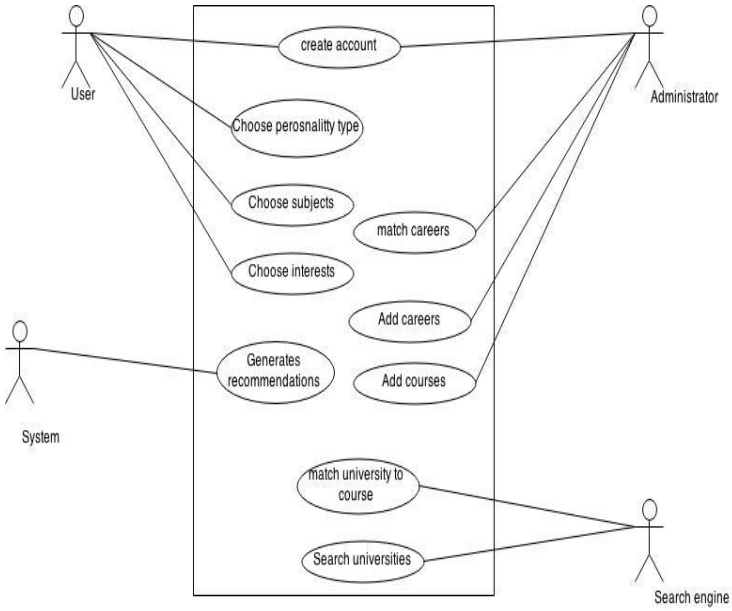


Fig3. *System Use Case Diagram*

3.3. Implementation and Testing

The User Frosting framework was used for developing Uni-Search because it provides a simple User-Interface and good foundation for the development of the system. The editor tool used was Aptana because it's a good syntax highlighter and supports multiple languages. GitHub was also used for synchronization of the code. The solution has been implemented and tested on windows 7 operating systems on the user side while a CentOS Linux for the server.

The first step toward putting this project into implementation was researching about what determines a person's career capability. We discovered that subjects done, one's personality type and interest have a significant effect on one's potential for a particular career. So we developed a database with tables for interests, personality types, subjects done at high school, careers, courses offered in Kenyan universities and universities in Kenya, and the relationships amongst them.

In terms of testing, Uni-Search underwent tests at every stage and step of development. There was more emphasis on having the system perform at optimum even on the most basic of machines. The aim was to achieve a page generation time of less than two seconds per page and an indexing time of fifteen seconds to the maximum.

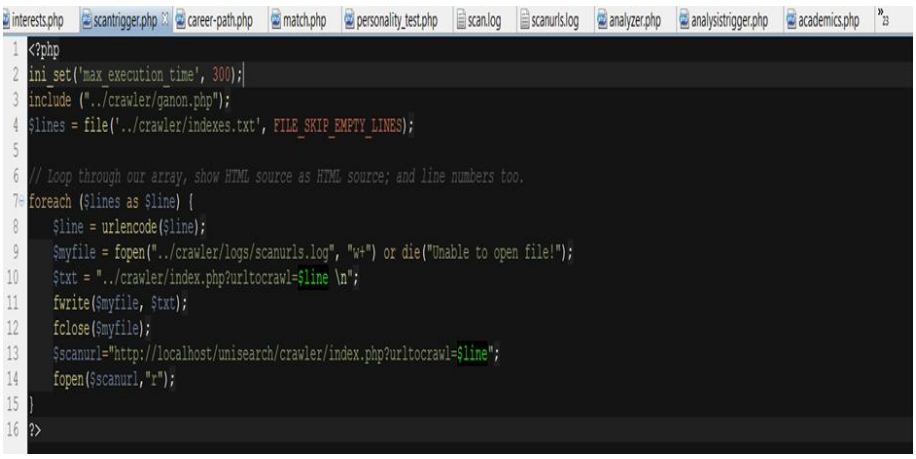
Fig4. *The Trigger for Crawling*

Testing involved the following repetitive tasks:

- Measure page loading speed
- Measure indexing speed
- Evaluate user experience

Resources:

- Two computers running different operating systems and software
- One computer acting as a host of the application and server
- People



```php
<?php
ini_set('max_execution_time', 300);
include ("../crawler/ganon.php");
$lines = file('../crawler/indexes.txt', FILE_SKIP_EMPTY_LINES);

// Loop through our array, show HTML source as HTML source; and line numbers too.
foreach ($lines as $line) {
    $line = urlencode($line);
    $myfile = fopen("../crawler/logs/scanurls.log", "w+") or die("Unable to open file!");
    $txt = "../crawler/index.php?urltocrawl=$line \n";
    fwrite($myfile, $txt);
    fclose($myfile);
    $scanurl="http://localhost/unisearch/crawler/index.php?urltocrawl=$line";
    fopen($scanurl,"r");
}
?>
```

Fig5. *The Core of the Crawler that Scans for Universities*

The test Results obtained indicated that each of the computers was able to access the system and load it through IP address. The browser rendering times averaged 1.9 seconds while page generation times averages 0.5 seconds. Figure 4 shows the algorithm that triggers the crawling while Figure 5 presents the algorithm of the core of the crawler that scans for universities.

Figure 6 shows a page that displays the personality types. The User is allowed to select before clicking on the 'Continue' button.

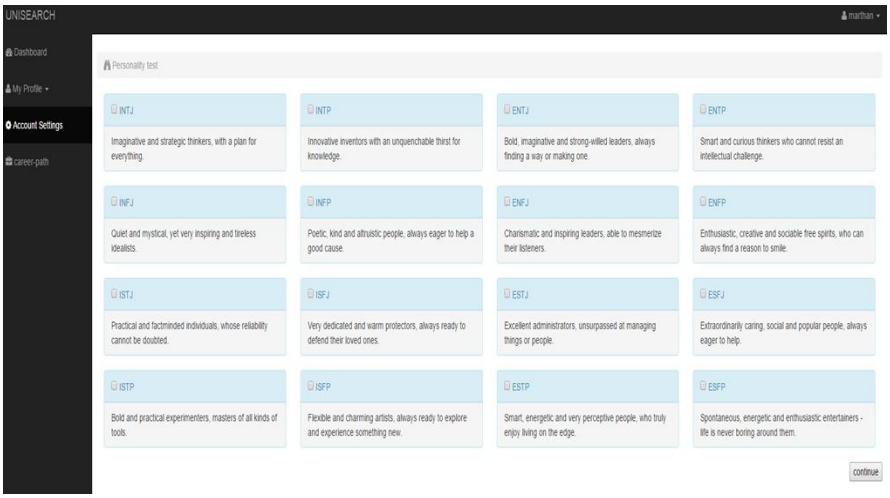


Fig6. *Displaying the Personality Types*

Figure 7 shows an interface that allows users to select the subjects and grades obtained. These are variables that are used in subsequent sections of the algorithm. The User is allowed to select before clicking on the 'Continue' button.

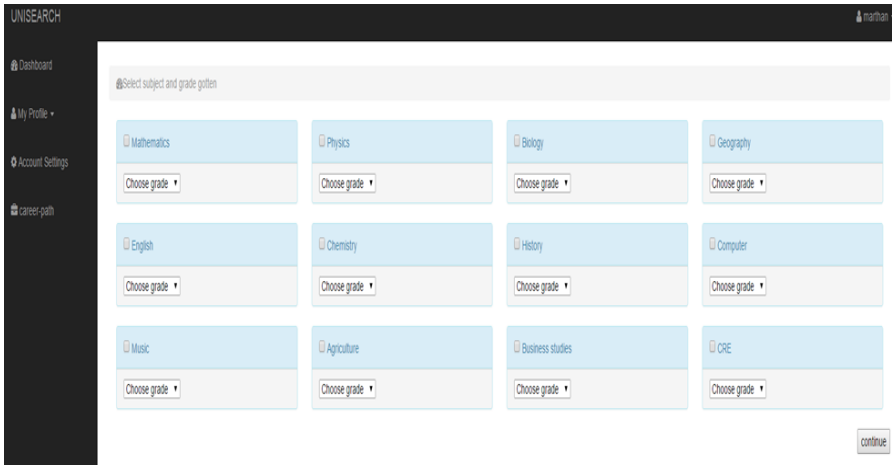


Fig7. *Subjects and Grades*

Figure 8 shows an interface that allows users to select the interests. This is an additional set of variables that are used in subsequent sections of the algorithm. The User is allowed to select before clicking on the 'Continue' button.

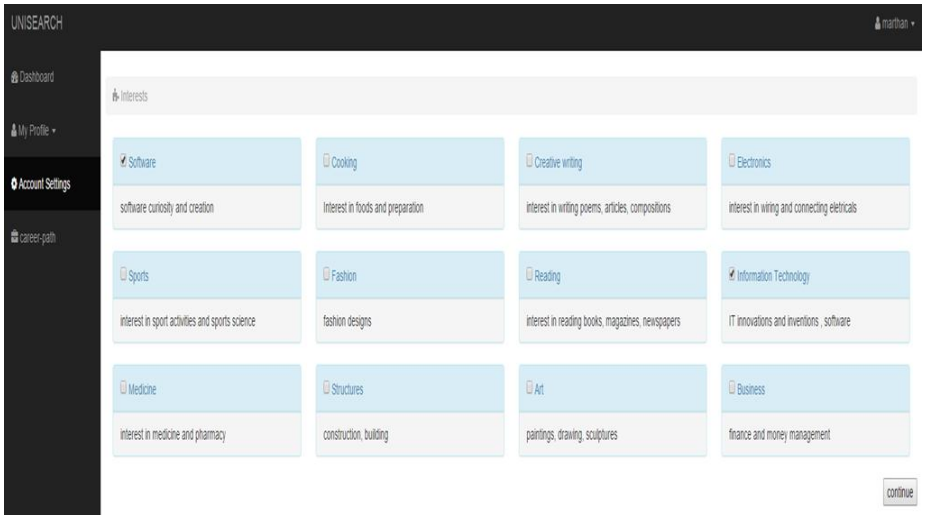


Fig8. *Interests Portal*

Figure 9 shows an interface that displays recommended careers with percentage indicating capability.

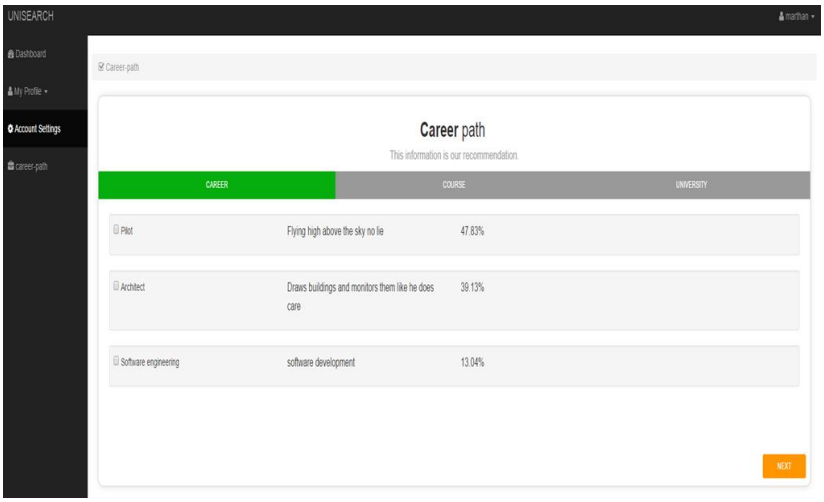


Fig9. *Careers with Percentage Capability*

Figure 10 on the other hand shows an interface that displays recommended course(s) pertaining to chosen career.

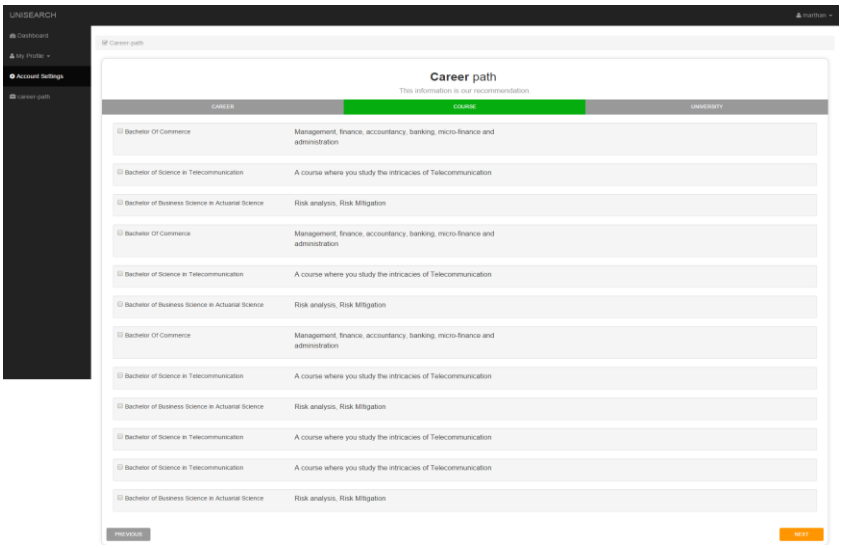


Fig10. *Recommended Course(s) Pertaining to Chosen Career*

Figure 11 presents the results after the crawling has taken place. It presents the results as the available universities (offering a particular course) based on the selections made earlier.

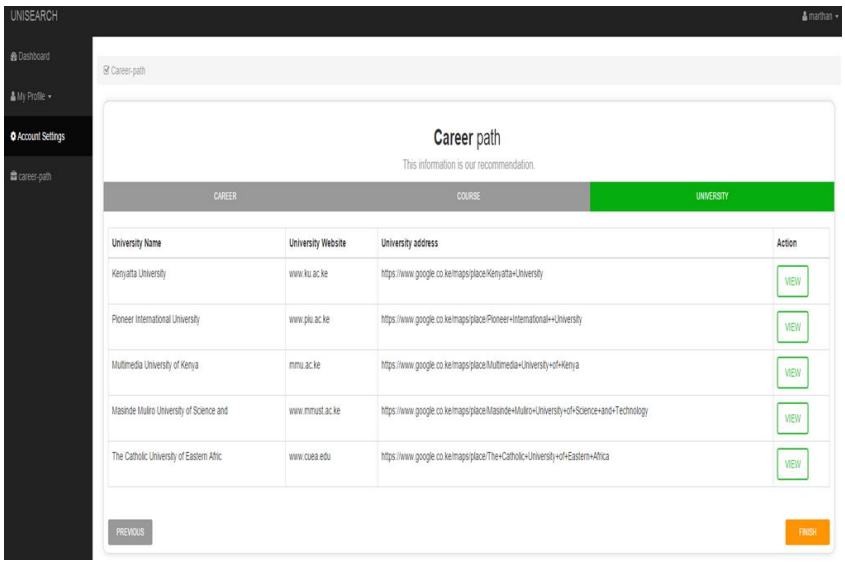


Fig11. *The List of Matching Universities as Results after Crawling*

Figure 12 presents an administrative portal that is used to present an analysis as well as ability to add more data to the system.

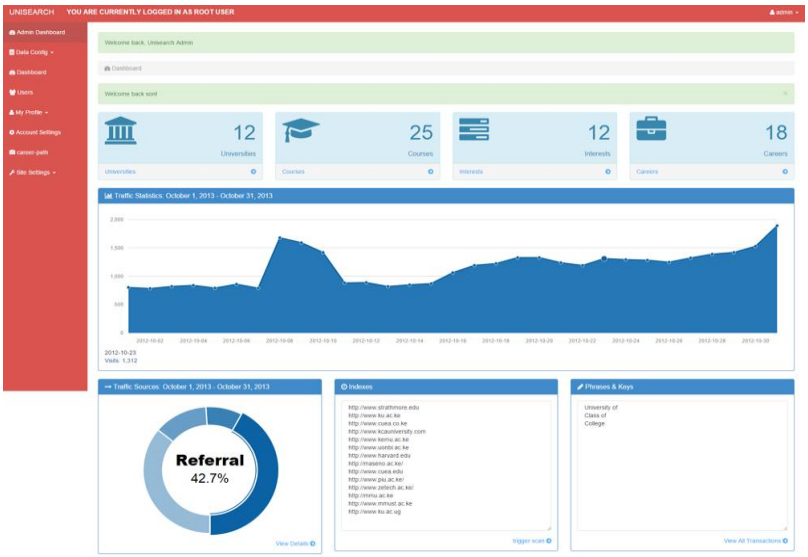


Fig12. *The Administrative Portal*

4. CONCLUSION

The aim of this research was at solving the problem faced by many individuals or potential students on the decision about which career they are capable of and what course to do. It is an issue faced by many, but the magnitude of its impact is often probably felt too late to be addressed. The solution referred to as Uni-Search helps counter the problem as it enlightens individuals about their capability and potential for particular careers based on their personality type, interest and subjects earlier done. The system also determines course to do for chosen career and the universities that offer the chosen course.

The proposed solution can be used to provide data for other software programs since it crawls the web to obtain useful data. Universities can use the system to monitor and analyse the uptake of their programs while individuals can use it to facilitate the determination of the career path.

REFERENCES

[1] Onoyase, A., and Onoyase D., 2013, The Relationship Between Personality Types And Career Choice of Secondary School Students in Federal Government Colleges in Nigeria, Asia Pacific Journal of Research, I(VIII).

[2] E. Cardy (2012). The 2 Biggest Reasons You Can't Decide on a Career Direction. [Online]. Available: http://blog.brazencareerist.com/2012/11/01/the-2-biggest-reasons-you-cant-decide-on-a-career-direction/

[3] O. Dickson and O. Anna. The Relationship between Personality Types and Career choice of secondary school students in Nigeria. Delta: Kamla-Raj, 2009

[4] F. Gerhard, and N. Helga. Personalized Intelligent Systems. Breckenridge, Colorado: Institute Of Cognitive Science, 1987

[5] D. C. Kreitzberg (2014). The Cognitive View. [Online]. Available: MSDN Magazine: http://msdn.microsoft.com/en-us/magazine/dd458810.aspx

[6] State of Arizona Career Center, Personality Types and Career Choices. Arizona, 2014.

[7] R. Mary, C. Peter, and I. Glendon. The role of personality in adolescent career planning and exploration: A social cognitive perspective. Journal of Vocational Behavior, 73, 132-142, 2008.

[8] D. Pennock, E. Horvitz, S. Lawrence, and C.L. Giles. Collaborative filtering by personality diagnosis: A hybrid memory- and model-based approach. In Proceedings of the 16th Conference on Uncertainty in Artificial Intelligence, UAI 2000, pages 473-480, Standford, CA, 2000.

[9] Monica, P. How Search Engines Work and a Web Crawler Application. Springfield: University of Illinois, 2014.

[10] W. Leslie, and L. Sharon. Interactive End-user Data Integration for a Geospatial Web. Stanford, CA: Stanford University, 2014.

[11] Schema Organization. (2015). Educational Schema. [Online]. Available: http://schema.org/ Educational Organization

[12] H. El-Ghareeb (2015). Object Oriented Analysis and Design. [Online]. Available: http:// www. slideshare.net/helghareeb/object-oriented-analysis-and-design-12164752

AUTHORS' BIOGRAPHY

Samuel Ngoda is an experienced IT consultant and the founder and C.E.O of Medulla Technologies, a graduate of Strathmore University and an award winning software developer who has represented Africa and Kenya in multiple technology fairs regionally and worldwide. He was listed among the top 20 techies to watch in 2012 and has been published in multiple dailies and blogs including Tech Moran, Crunch Base, Tech Sahara, The East African Magazine among others. He has consulted for multiple organizations including Mwanzoni Ltd, Strathmore University, JHPIEGO, Store66, Wida Hotels, Institute For Family Business, AutoExpress, Izon Systems Ltd, Sakata Media, Ghetto Radio Ltd, Radiant Systems Ltd, The Enabling Foundation, among others. He enjoys playing chess, travelling and spending time with friends during his rest time.

Dr. Bernard Shibwabo Kasamani earned a Bachelor's Degree in Business and Information Technology, a Master of Science in Information Technology and a doctoral degree in IT from Strathmore University. He is currently serving as the Academic Director in the Faculty of Information Technology at Strathmore University. He is also a member of the steering committee for the Annual Strathmore ICT conference. He has developed major solutions that solve a wide range of societal challenges e.g. Banking, Legal, Academic Trade, Health. His research interests include Systems Integration, Dataspaces, Data mining, Business Intelligence and Applications.

John Paul Kayima received a Bachelor's degree in Business and Information Technology from Strathmore University. He likes programming.