Web-Based Expert System for Personalized Psychotherapeutic Counselling

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Abstract— *Sri Lanka has one of the highest suicidal rates in the world. It has been found that these cases were caused mostly as a result of mental health disorders, such as depression and anxiety. A recent study conducted at the Rajarata University showed that approximately 5-10% of the Sri Lankan population suffer from some form of mental health condition that require treatment.(Jaufer, 2016) This study aims to examine the development of a Web-Based Expert System which will provide Personalized Psychotherapeutic Counselling for anyone in any location. If everyone who has a suffering problem and have no one to share their grievances could use the proposed system, then everyone will have a hope and happiness in their lives and the suicidal rate would decrease significantly. The main objective of developing this system is to address all the drawbacks of the currently available face to face counselling system, while this system mainly focuses the Sri Lankan community. This system will perform as a platform to connect clients who need mental health advices, with licensed counsellors of Sri Lanka. The significance of the proposed web based counselling system is, that it will present a set of standard and psychologically approved questions to the clients before receiving the counselling service. By using Prolog Logical Programming Language, the answers provided by the client will be analyzed, and then the system will predict the area of the problem of that particular client. Then, the system will direct the client to the relevant counsellor that has specialized on that relevant area. Finally, the client could use a preferred method of communication facilitated by the system, to communicate with the counsellor. The system will also use encryption methods to ensure confidentiality of the conversations carried out between clients and counsellors. The proposed system will be a fully integrated version comprised of a Web Application, Android Mobile Application, Short Message Sending (SMS) gateway and a Payment gateway.*

Keywords— Personalized Online Counselling, Web Based Application, Psychological Analysis, Prolog

I. INTRODUCTION

According to the statistics by the National Institute of Mental Health (NIMH), only 20% of mental health sufferers receive treatment, one of the main reasons being that treatment is usually available only in cities. In addition, the main problem is that Sri Lankan society neglect mental health-care or counselling due to social stigma. *(Jaufer, 2016)*

According to Prof. Nalaka Mendis, Professor of Psychiatry Faculty of Medicine, Colombo and Vice President Sahanaya, National Council of Mental Health, there has been a definite growth in the number of those who suffer from mental illnesses during the last ten years. Resident Representative of World Health Organisation (WHO), Dr. Kan Tun has stated that 10% of the global problem of diseases are due to mental illness. Further he has stated that mental illnesses are commonly investigated in developing countries and especially in those countries where there was a civil war. Dr. Neil Fernando, Consultant Psychiatrist has stated that forces personnel have become mentally ill solely due to the war. According to Prof.Mendis although Sri Lanka has cheap and cost effective counselling services, the country lacks experienced doctors in the field and also the professionals in this field are mainly available in urban areas so the clients tend to neglect their need for counselling service and remain suffering and worrying. Ultimately they choose suicide as a remedy to get rid-off their untold problems. ("Mental illness on the increase - Sahanya-Island," 2001)

Most of the people keep away from face to face counselling services due to many concerns. A major reason is due to lack of knowledge. Many individuals especially in rural areas lacking education has no any idea about psychology, so even if they actually suffer from a mental illness they identify it as a Mysterious force and go for mythological remedies. Some other problems why people neglect counselling is due to financial inabilities and lack of transportation facilities. Some individuals with mobility difficulties or physical inabilities such as paralysis or problems in limbs will not be able to meet a counsellor. So they tend to remain silent and suffer alone. Reluctance to be exposed to the society is another main reason why people disregard counselling. Negligence of counselling or psychotherapy due to public humiliation is a common and a major reason in our country. Sri Lankan society consider, getting psychological advices or meeting a counsellor as a shame and label such a person as a "retard". If clients who use to attend to continuous counselling sessions, will have to migrate to another country, the client will no longer be able to meet the counsellor. Boundary barriers is another reason why clients terminate counselling.

According to my perception and study, "Online Counselling" would be the best solution to address these problems stated above. It is conventionally assumed that the first professional fee-based online individual psychotherapy started in 1995. (Metanoia,1972)

Online Counselling is a field that shows a tremendous growth in the past ten years with the advancements in technology and widespread use of the internet. Studies have identified that more clients are seeking help from online counselling services. (Murphy et al., 2009). Currently, an Online Counselling System which focusses mainly the Sri Lankans, is not available. The proposed web based psychotherapeutic counselling system (YourCounsellor) will be designed essentially focusing the Sri Lankan community. But also the system enables any personal in any part of the world to interact with the system and to get counselling service. Online Counselling will never replace the traditional method of face-to-face therapy. Researches that have been conducted to find whether the clients choose Online Counselling over face to face counselling have identified that both the methods are accepted equally by the society. E-therapy is another way of reaching people who are unable to get any other help. (Murphy et al., 2011), (Cook and Doyle, 2002)

II. LITERATURE REVIEW

A Google search on "Online Counseling" retrieved about 4,060,000 results, (latest result - 59,100,000) the top most included famous websites which provide online chat facility to acquire counseling services.(Dowling and Rickwood, 2013)

Some of the most popular websites available in present day which provide online counselling services are:

- 7 Cups of Tea
- Betterhelp
- Breakthrough System
- Butterfly
- kidsHelpline
- MindSpot
- Online Counselling directory
- PlusGuaidance
- Talkspace
- YourDOST

A. Technology

All of these web based systems uses web technology. But some of the sites such as breakthrough, betterhelp and talkspace provide mobile application facilities too. The proposed system will use both web and mobile technologies to increase the efficiency and usability.

(BetterHelp, 2013), (© Breakthrough and Policy, 2009), (Talkspace, 2014), (Baumel and Schueller, 2016).

B. Bi-Lingual Interface Navigation

The proposed system will provide Bi-Lingual Page Content facility which means that the system enables the clients and counsellors to interact with the system in a preferred language, either English or Sinhala. So that even a person who has less knowledge in English could navigate via pages and use this system effectively to get counselling advices. None of the above mentioned websites provide bi lingual or multi lingual facility. So it proves that the proposed system carries a distinct feature than the other available Online Counselling sites.

C. Language Selection

Language selection for therapy sessions is another feature which will be provide by the proposed system. The client will be able to select the language that he or she prefers to communicate with the counsellor. Systems such as PlusGuiadance and Online Counselling directory provide this facility too. But the proposed system is different from those systems since the system itself identifies the language preference of the client and select the counsellor accordingly. Simply, the system considers the language too, when selecting the counsellor to the particular client. ("Find Online Counselling Today - A List of the Best in the Field."), ("PlusGuidance -from Professional Therapists.")

D. Communication Methods

Both Asynchronous and Synchronous methods of communication such as Email, Online Chatting & Video Chatting facilities will be provided by the proposed system. This feature is available in most of the web based systems mentioned above but only a few of them provide all of these options in one place. The proposed system will be facilitated with all the possible communication methods.

E. Professional Counsellors

The proposed system only allows Qualified, Licensed Professional Counsellors to be registered into the system since the system tackles with the human brain and mind, it is risky to allow clients to get help from therapists who are not qualified. Among the above mentioned systems MindSpot, betterhelp, breakthrough, talkspace, PlusGuidance provide professional advice. Other systems recruit any type of listener and allow them to advice the clients. ("MindSpot Clinic | Home.")

F. Personalized Counselling

The proposed system will provide therapy only by analyzing the client's mental level. The system will ask a set

of questions from the client so that the client's mental level will be measured and the basic problematic area of the client could be identified. The client will be provided with the most appropriate counsellor who has specialized in that relevant area of psychological issue. Systems such as betterhelp and PlusGuaidance also have the feature to measure the mental level but the proposed system is unique, that it only enables the clients to receive counselling after the mental level analysis. This method enables the client to get advices only from the relevant counsellor.

G. Payment Method

Almost every other system provides therapeutic sessions after a payment. Butterfly website will not allow to access into any option without paying and signingup. Only a few like PlusGuidance and 7 Cups provide a free session for a limited time. Only the proposed system will permit a 3 Day Free Counselling Session Period which will allow the clients to check whether the counselling session worth enough. ("7 Cups Subcommunities."), ("Chat Online » The Butterfly Foundation.")

H. Group Counselling

Free Group Therapy Platforms are only available in 7 Cups among the mentioned websites. Some of them provide group therapy session but for a fee. The significance of this proposed system is that all group session will be freely available for any user.

I. Information Security

Information Privacy or confidentiality is a major feature that should be considered in online counselling. The proposed system will be developed, following various security mechanisms such as encryption, VoIP, IM protocols and authentication mechanisms.

J. Other Features

Most of the above mentioned have complicated interfaces and also some of the pages in websites such as kidsHelpline has expired. Users might not be able to interact properly and easily since the interfaces are full of bulky information all over the page. The proposed system will have user friendly interfaces with clear navigations and guidelines to use the system and get the ultimate services from the system. ("Teen Online Counselling | Kids Helpline | 1800 55 1800.")

All the users should be able to access an online counselling system regardless the physical inabilities. In the proposed system a feature will be included where the mouse could be completely controlled without hand movements but eyes or head. So that all the users will have the ability to interact with the system. None of the above mentioned systems have a feature as explained.

If a counsellor which the system chooses as a match to be communicated with the client is not online, the System will notify the counsellor via an SMS notification to that particular counsellor. None of the above mentioned web based systems imposes this feature as well. Which proves that the proposed system is unique than the currently available Online Counselling System.

III. RESEARCH METHOLOGY

Since the proposed system will be finally used by the general society and the counsellors, the opinion of counsellors and the society should be take into consideration. So as to gather information on their views, both qualitative and quantitative methodologies will be used as data gathering techniques to design the requirement specification. Questionnaires and Interviews will be the main data gathering methods that will be used to gather the requirements and the information. All the required data will be collected by distributing a well detailed questionnaire among the general public via both online and offline methods, to grasp the opinion on introducing the proposed system which will help to identify what they prefer from such a system and also to get a statistical clarification to identify the percentage of people who use mobile phones or computer along with Internet, to ensure whether the system could be used by common people without any difficulty and barrier. Interviews will be conducted with counsellors and psychiatrists to ensure whether the proposed system will be efficient, helpful and ethical enough to serve the common people.
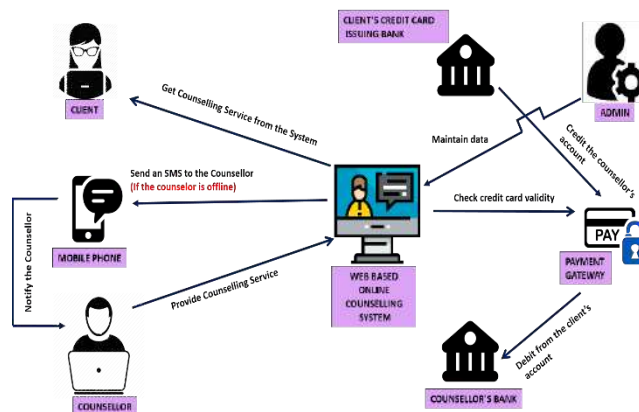
IV. CONCEPTUAL MODEL

Figure 1. Overall Conceptual Model

V. APPROACH

The main users of this system are the clients and counsellors. In addition, a system administrator can also access the system. According to the above illustrated figure 1, there are five main modules of this system. Namely they are; Admin Module, Client Module, Counsellor Module, System Module and Group Counselling Module.

A. Admin Module

Admin do not perform a major role in the proposed system. Admin will have access to view counsellor details, view the number of clients registered, view feedbacks and view counsellor names who have been reported by other counsellors and also the upgrades and maintenance will be performed.

B. Client Module

Clients will have to select the language (English or Sinhala) before any process. And also, clients with any physical impairment can enable the accessible mode on the start-up page and control the mouse using eye or head movements throughout the system. Then, the system will provide a client who is willing to obtain the counselling service for the first time, a set of psychologically approved questions before the first session. So that the answers will be analysed by the system and will predict the mental level or the problematic area of the particular client.

Then, the system will direct the client to the most specific counsellor who has specialized on that relevant problematic area. The clients can access the system and obtain counselling service for free only for 3 days and then, after 3 days the clients should get registered to the system by creating a preferred username and a password. Clients will be facilitated with latest methods of communication such as instant messaging, voice messaging, video conferencing and many other media sharing means, to communicate with the relevant counsellors.

Clients can give feedbacks and also will have to rate the counsellors after every session. Clients will not be able to view all the counsellors in the system. The client can only view all the details such as the full name, qualifications, licence number of the counsellor who will be selected by the system which is suitable to that relevant client. Clients can also request another counsellor if he/she is not satisfied with the provided counsellor. But this request can be performed only within the free trial period. The client could terminate at any time he/she prefers.

C. Counsellor Module

Counsellors will also be provided with Language selection and accessible mode in the start-up page. Counsellors will have to get registered to the system at the beginning. The system will approve the registration by analysing the details provided by the counsellor. Specifically, the license number provided by a counsellor will be checked from a dataset which contains licence numbers of legitimate counsellors approved by the Sri Lankan government or Internationally. The registration approval will be given to the particular counsellor, only if the license number is available in that dataset.

After registration the counsellor can login to the system and carryon with the sessions. Counsellors can also give feedbacks to the system. Counsellors can view all the details of other counsellors registered in the system, so that if a counsellor identifies an illegitimate counsellor by any chance, he/she can report that particular counsellor.

D. System Module

As this is an expert system, the system itself performs huge complex tasks. The system will analyse the answers given by the clients to the set of standard questions and predict the accurate problematic area or the mental level and direct the client to the specific counsellor. And also before allowing the counsellors to join the system, the system will check for the validity of the provided license number. If any counsellor is offline the system will send an SMS notification to that particular counsellor's mobile phone. Another function is that, if a counsellor be reported by 5 other counsellors the system will remove that particular counsellor who has been reported.

E. Group Counselling Module

Group Counselling facility will also be provided by the proposed system. This will be an open space that allows any person regardless whether it is a client or a counsellor, to post their problems anonymously. Then the other members could give their opinions.

F. Technology adopted

The most appropriate technology for developing the system have been decided by considering the system domain and the requirements. It is much significant to select the technological methodologies which will be capable to satisfy both the functional and non-functional requirements of the system. Since the proposed Personalized Online Counselling Expert System is a web based system, more consideration will be given in selecting latest technologies. The technological methodologies will be selected in such a manner that it will help the system to be available at anytime, anywhere and also to make it efficient and effective.

With an in-depth analysis of the system requirements, PHP will be used as the main programming language to develop the backend of the system. Polog is the substantial programming language that will be used to develop the complex analysis and prediction functions of the system. The knowledge base will be created by a deep medical analysis to identify symptoms of each area of medical disorder and the relevant counsellor type. The gathered facts will be logically categorized and programmed for the

prediction purpose using Prolog and will be connected to the Web Application. The database of the system will be implemented using MySQL. The front end of the system will be developed using the programming languages HTML and CSS and also the bootstrap framework will be used to make flexible and user friendly interfaces. The validations of the forms and access controlling will be done using JavaScript. The system will guide the users to create a highly secured password to confirm privacy and data security. The security of online transaction details will be ensured by using data encryption mechanisms and technologies such as SSL to prevent eavesdropping and Man-In-The-Middle attacks.

CameraMouse Software will be embedded with the Web Application which enables the user to move the mouse with only eye or head movements. CameraMouse is a simple software with a simple user interface where the user must allow the camera to capture the real time face image by which it allows the user to select a point on the head, specifically eyes, and there onwards the mouse will follow that particular point. The user could navigate the selected point to left or right to move the cursor left or right respectively.

VI. EVALUATION

An evaluation will be performed to verify whether the requirements and the objectives have been fulfilled by the system. The proposed system will be evaluated by employing three test cases. The first test case will be done by requesting a set of selected counsellors to interact with the system, check the knowledge base used for measuring the basic mental level or the problematic situation of clients, the process of directing the clients to relevant counsellors is medically approved and finally to get the approval to implement the system. The second test case will be done after receiving the approval from the professional and reputed counsellors. Then, a selected group of common people with various cultures, and people with different incapability and people from different areas of Sri Lanka will be expected to interact with the system and will be checked whether the interfaces are user friendly and understandable for everyone. Finally, after the approval of the above stated test cases, the third test case will be carried out. Here, both the clients and counsellors will be allowed to use the system to communicate with each other "online" and as well as "in-person" to crosscheck whether the predictions performed by the system is accurate and also the ethical issues will be discussed so that steps could be taken to reduce such ethically problematic circumstances.

VII. CONCLUSION AND FUTURE WORK

The Proposed System covers the entire online counselling process with more enhancements than the existing online counselling systems, such as the opportunity to receive personalized counselling advices from the most suitable counsellor and the possibility to use various methods of communication by the clients and the counsellors. The service provided by the proposed system will be beneficial for both ordinary and handicapped individuals, since the system has an accessible mode which allows the clients, particularly who have less capacity to handle a mouse by their own, to control the mouse pointer by their eye or head movements. As well as that, any person of any part of the world will have the opportunity to access this system. Since this system only get the service of legitimate counsellors, the advices provided to the clients will be consistent. This system will also increase the quality of life of people. From 1995, Online Counselling has provided an important service for people, to face their life dilemmas positively. Since then, various enhancements have been done to improve the effectivity and the interactivity of the Online Counselling process. The proposed system will use latest technologies to develop the system. Future enhancements can be performed, such as, enabling Navigation in Tamil Language and also language translation in real time instant messaging, so that counsellors that communicate in a particular language could easily communicate with a client that uses any language without any barrier.

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