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Robotics In HealthCare

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Abstract— Robots have been put to use in many fields mostly for automation or areas where a great degree of precision is required. Robots can be of huge assistance in medical field too, as they can relieve the patient or the medical personnel from routine and mundane tasks, which may sometime be very crucial and may need to be performed with utmost care, accuracy and precision. The use of robotics is already there in healthcare, but it's not main-stream yet and it would take some time for that to become a reality. The main goal of this research paper would be to shed some light on the same. I have proposed some ideas on how robotics can be used in some niche in healthcare, and how it can be made easy to spread and implement on the ground level. Focus on the need of robotics in healthcare, along with their added advantages in the quality of healthcare and the savings in long time costs would be there. With this, the future of healthcare i.e. Telemedicine would become a reality and it would be a lot easier and cheaper for people to get access to quality healthcare, anywhere in the world with physically attending the hospital.

1-INTRODUCTION

The outburst of growth in technology not only results in the increase in efficiency of the current technology in use, but also the invention of many new technologies that is possible by utilizing the research and development done in the fields like that of imaging technology. The technology that has been researched upon and have been developed by scientists throughout the years are finally taking shape in front of our very own eyes. One of such technology is that of robots. They can put into reality countless acts and services that one can imagine, with the precision of a skilled human professional and with utmost quality too. Due to these traits in the field of robotics, it is very habitual of us human beings to utilize them in the field of medicine and especially in surgery and rehabilitation. One such splendid robot that is being used today in the field of medicine is the Da Vinci Surgical robot system. This robot has been very carefully designed and put together for in body that is, endoscopic processes. This robot is precise enough to reach parts of the body that need extreme care and very precise movements. Thus, it is being used in medicine and has completed many successful human surgeries.

2-LITERATURE SURVEY

1) Butter, MRensma, A Korhonen et al.[1] proposed some work within the niche of information and communication technologies. They cited in their papers that from the last two many years the European fee (EC), and particularly the Directorate well-known facts Society and Media, has been strongly helping the utility of data and verbal exchange technology (ICT) in healthcare. ICT is a permitting technology which can offer diverse solutions in the healthcare quarter, ranging from electronic affected person information and health statistics networks to sensible prosthetics and robotized surgical treatment.

2) Nikos I katevas et al. [2] proposed their work on robotics interpretations. The term robotics when viewed from a wide range of perspectives can sometimes mean the misinterpretation of the term and can result in miscommunication amongst the individuals. Even after the fact that it's not a very new term, the term "robots" or "robotics" has been used by common people and professionals throughout the centuries in many pieces of their work where they highlighted the fact that the capability of this technology can be put to use and this can change the understanding and interpretation of the term among the masses.

3) Sarah M.RabbittaAlan E.Kazdin aBrianScassellatib et al.[3] proposed their work within the niche of mental care in robotics. As a field, intellectual healthcare is faced with predominant demanding situations as it attempts to close the big gap among those who want services and those who acquire offerings. In latest a long time, technological advances have furnished interesting new sources on this battle. Socially assistive robotics (SAR) is an especially promising place that has multiplied into several exciting intellectual healthcare applications.

4) Laure-Anne Pessina, Ecole Polytechnique Federale de Lausanne et al[4] proposed their work inside the area of soft robotics, which has an already massive marketplace inhospital therapy. An EPFL group has put some incredible thought and effort into developing soft robots which are air driven and behave like real human tissues. These can very well be utilized in physical rehabilitation processes. They are developed and will be manufactured from low cost materials, which makes their reach and availability possible in most parts of the world, including developing countries and conflicting states.

5) Bernd Carsten Stahl et al.[5] proposed their work within the area of ethics in robotics generation. They requested some essential questions like "How can we discover , and deal with the moral issues that would rise with the rise of robotics technology in the field of healthcare?" The paper sheds some light on the fact that apart from moral analysis of the case, traditional type assessment and philosophical questioning and speculation will give us a different view to the case. Talking on the same, gathering perspectives, testing in the field would help us achieve our objective very fast and would make robots socially acceptable.

3-PROPOSED WORK

1) Insight and introduction to tele-medicine and future relevance:

Telemedicine is the remote transport of healthcare offerings, inclusive of health checks or consultations, over the telecommunications infrastructure. It permits healthcare carriers to evaluate, diagnose and deal with patients the use of not unusual technology, which includes video conferencing and smartphones, without the want for an incharacter visit.

Fig. 4.A Telemedicine workflow diagram

As various parties are trying to find more efficient ways to provide care at less cost to the affected person, tele – medicinal drug's function has grown. It is often a timesaving manner for a customer to see and talk to a clinician for minor and non-pressing medical needs in preference to going to a primary care health practitioner's workplace or emergency department. In the recent years, many

states around the world have listed out laws that make the adoption and employment along with implementation of telemedicine very difficult.

Coming back to the wonders of telemedicine, imagine a future where the medical professionals can diagnose you at home, but they themselves are present thousands of kilometres away. That's where robotics comes into play.

A very low ping (response time) internet connection, paired with smart sensors and actuators can give the professional a real time feed of the patient's physical composition, which can be used effectively to deliver aid.

2) The need for ethics of robotics in healthcare:

A very few electronics experts believe that robots, like present-day computer systems, will be a commonplace region, specifically in the subject of healthcare and remedy. A diverse assortment of robots, with various functions, capacities, bureaucracy, and sizes, is rising with substantial implications for the coverage, provider and regulatory duties of the presidency in healthcare. This explores health care, where the use of robotics is already vast or where it is projected to grow significantly and wherein massive ethical troubles exist or are anticipated, making use of moral theories to using robotics is extraordinarily hard within the close to-term, the point of interest has to be on the moral standards and behavior of those designing, production, programming and working robots for scientific use. numerous key subjects in modern-day public zone ethics, together with private moral duty, privateness, and responsibility, are relevant to the emerging field of robotic ethics. This shows growing an ethics regime for robotics and analyzing the need for legal guidelines and guidelines governing its use.

3) Robotics in mental care :

The use of robots in the field of healthcare is great, but in the hands and minds of a creative thinker and problem solver, it can be applied to some other niches too, like mental care. The intent of this portion is to shed some light on the field of mental care which has been neglected upon, discuss the use of latest technology in this area and try to figure out a number of issues and ethical dilemma of employing a robot in this area while exploring the potential of robots in mental healthcare.

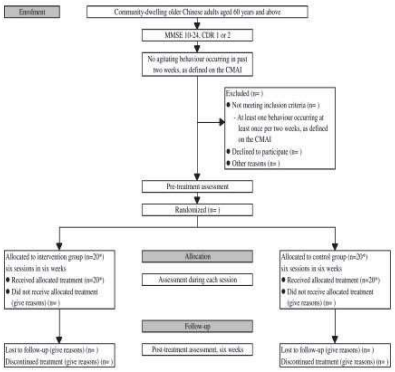

Fig. Socially adaptive robots study design.

AI DEVICES :

This portion focuses on the different categories that the Artificial Intelligence devices fall into:

1. Machine Learning getting to know (ML) technique: Analyse imaging, genetic code and other data. In medical programs, these techniques try to group trends of the patients or point to the probability of the resurfacing of the diseases and it's consequences.
2. Natural Language Processing (NLP) technique: This technique extracts statistics from various unstructured data and facts containing in medical notes and clinical journals to other records and research data. This technique aims to convert such text into gadget readable dependent data which can be analysed with the use of Machine Learning techniques.

For pictorial or graphical representation, the flowchart below describes the map of flow of data from medical information technology, through Natural Language Processing statistics enhancement and Machine Learning statistics data analysis, to the clinical decision making. Artificial Intelligence can be wonderful and we cannot comment on that, but it can only be stimulated through scientific data currently and can only be used in scientific decision making aid.

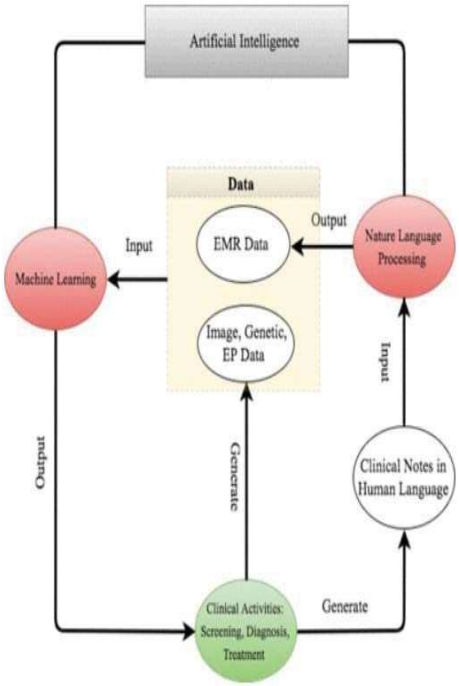

Fig. Medical AI

4-METHODS

Ethics and Permissions

This study received Institutional Review Board approval from the Centre of Population Health Sciences at the University of Edinburgh, United Kingdom. Participants gave written informed consent to participate, and transcripts were anonymized

Data Collection

Interviews were conducted over Skype, digitally recorded, and transcribed verbatim by a professional ranscriber. These ranged from 30 to 90 minutes, depending on the schedule of the participant and the number of issues they wanted to discuss. We explored the most promising areas surrounding health care robotics, their benefits and risks, anticipated and observed challenges, and potential ways to address these from a variety of technical and social angles. We stopped recruiting participants when we reached thematic saturation (ie, when no new themes emerged during the concurrent analysis) To ensure that participant voices were reflected accurately, we performed member checking by sending the results to all participants and giving them the opportunity to comment on and correct any misunderstandings . This resulted in minor clarifications to the results, consisting mainly of adding further details and context.

Data Analysis

Transcribed interviews were uploaded to NVivo 10 (QSR International Pty Ltd) software, which supports the management and interrogation of data and helps arrange qualitative data into meaningful headings and subheadings. We began the coding process as soon as interviews were transcribed to allow emerging findings to feed into future interviews; this involved sorting data into meaningful headings and subheadings for ongoing thematic analysis.

5-LIMITATIONS

The response rate to interview invitations was low (only 21 out of 68 individuals agreed to be interviewed), in part reflecting concerns about disclosing commercially sensitive information. We may therefore have missed some important considerations (despite having achieved thematic saturation within our sample), particularly from cultures that have integrated robotics in everyday life (eg, Japan). Additional factors that are likely to have shaped the sampling of respondents include the presence on Google and LinkedIn, access to Skype, English language facilities, and the Google search methods employed by the researcher. We therefore necessarily explored the views of those who were visible and vocal in relation to health care robotics in English media. Although this was appropriate for gaining a high-level overview into an underexplored topic, it also means that our results are likely to have missed the perspectives of certain user groups (eg, health care professionals and patients with or without the experience of robotics). This may have led to a lack of insight into the acceptability of specific applications. Such work is important going forward as many of the challenges identified are heavily dependent on individual settings, technologies, and contexts. Moreover, we acknowledge that we have only skimmed the surface of exploring ethical, legal, and policy dimensions of robotic applications in health care settings, and this would certainly be a fruitful area for further in-depth research. There was also a clear gender imbalance toward male respondents in our sample, perhaps due to the fact that experts in this area are predominantly male.

6-CONCLUSION

Sociotechnical challenges surrounding the implementation of robotics in health care settings are significant, although these are likely to vary with different robotic applications and in different cultural contexts. These challenges need to be anticipated and, if possible, proactively addressed. Health care settings are characterized by their care work; the provocation is to preserve and intensify or augment this within an increasingly automated and technological environment. This can only be done if we anticipate challenges associated with new technologies and systematically address them as we integrate them within existing social orders. Our research should be seen as a stepping stone to stimulate wider discussions surrounding these challenges. It can also help to guide health care organizations and policy makers as they make important strategic decisions associated with purchasing, developing, and deploying robotic applications.

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