MINI REVIEW

Artificial Intelligence (AI), Genomics and Personalized Medicine

Shaheen N SHAH[1], Safa SHAHEEN[1]
[1]Genomics Central, Kochi-21, Kerala, India
*Corresponding Author email: unix.shaheen@gmail.com

ABSTRACT

The Future of Treatment lies in Technology. The hottest Technology that's revolutionizing our lives indirectly via Google, Apple is AI or more specifically Deep Learning (DL). There is nothing more important that Human Health, and Human Wellness is defined by the Health, or in other words, the Medical Systems. Medicine has gone past the normal Clinical Allopathic practices for the general population, being more Personalized at the gen"omics" level. With Alternate forms of medicines finding traction esp. in the Indian subcontinent, and certain of practices like the cupping *hijama,* as seeing during Rio 2016 Olympics, an inclusive approach – using AI in Genomics extending in to All reliable practiced form of medicine is the approach forward.

KEY WORDS: *Genomics, Artificial Intelligence, Integrated Medicine, Machine Learning, Modern Medicine, Data-Driven Medicine, Deep Learning,*

Introduction

The concept of personalized medicine has evolved with current trends in genomics giving the extra bit of personalization, in theory at least. While classical genomics inclusive of Big Data (without using Ml/AI) still is years away from delivering tailored personalized medicine (Alyass *et al.,* 2015) – that data to crunch, the different variations and scenarios with different genome sets doesn't make things simpler

All the while when we have lots to "crunch" deduce and try, we have not to fully explore the solutions - modern & alternates. And the high end "solutions" that currently being specialized is majorly in modern medicine.

Background

The Indian subcontinent is filled with "alternative forms of medicine – with many institutional teaching and practicing them. Issue does remain in standardization and clinical trials as per Allopathic standard, due to which they lack enough recognitions in those circles. From the recent nature article (Nature India, 2016) speaks of fairly direct natural extract for cancer treatment, the natural/alternate forms do find traction in the Indian subcontinent, and have had selective relative impact in treating various ailments, though disputable in some circles. In places like the Middle East have had the Unani form as well, the focus here being different "body types " responding differently to ways of medicine -some respond better to homeopathy vs. Ayurveda etc.

Renowned hospitals like the Amrita (Amrita Hospital website, 2016) give Integrated Medical treatment- combining Modern and Alternative form, which is in turn, a common man's personalization (reference).

Artificial Intelligence in medicine (AIM) (Coiera , 1997) helps what's called *Data-Driven Medicine*. And currently, it's set to modern methodology of treatment based of their cases' database derived from modern medical techniques only.

Modus Operandi

Here we face two AI fronts:

A. Part where in the Machine Learning (Deep Learning to be precise) needs to be oriented inclusive of the proven/documented success cases in Alternative forms be in Ayurveda, Unani and/Homeopathy, encompassing a greater & more challenging deviations .Here, the challenges would be for the practitioners of different forms of medicine to "train" or teach the AI to "learn" deeply. It's here where we define *Deep Learning* defined as branch of machine learning based on a set of algorithms that attempt to model high level abstractions in data by using a deep graph with multiple processing layers, composed of multiple linear and non-linear transformations (Yu *et al.,* 2014). One should note that, it final "treatment" still comes from the human doctor.

B. The wider Genomics part wherein active efforts to see how the isolated metabolite works at the "omics" levels – genomics, transcriptomics – in the *Geographical Areas of Focus:* Middle eastern/ GCC Countries like the UAE, KSA having a sizeable expat population can play host to the myriad of phenotypes present in their mixed, population-Arab European Asian mix **(**Kapiszewski , 2006).As for the local UAE population studies, cue can be taken from The Qatar genome 4 where in some families (like Suawaidis) share ancestry across the borders. In matters of transcontinental diversity and well as ease of access to the "local" Indian subcontinent population (of India, Pakistan, Nepal, Srilanka) efforts in the UAE in the above direction and collaboration with parent countries would bear considerable fruit.

The GCC is unique, in terms of proximity and expat population, and standards of Health care set, with many expats – both Indian and non-GCC Arabs- living their whole active lives here. And of course, the data from "alternate" treatment being followed in the GCC region – Unani for example, can be integrated into the Indian databases, addition to its richness.

Why Data and Data Diversity matter

In both the front of AI, Data matters → the more the cases handled and treated (along with Genomics' processed Data), only then can the AIM can learn more, finer, and improve on accuracy. .And for Data diversity, both the GCC and Indian

Subcontinent population along with the different "Integrated" medicine document methods, must be taken into consideration. The second part of AL/DL goes of course to the post Next-Generation Sequencing+ part wherein time, speed, and accuracy matters. Effort must be set into motion for having wider, broad based collaboration set at the inter-continental and interdisciplinary levels.

How do we start?

It would with AIM with the likes of IBM Watson **(**IBM Watson Health Website, 2016) to have the physicians from all forms of medicines to start engaging with such high-end technologies, and then move ahead with higher Machine Learning/ Deep Learning processes.

Why the need to surge

Here we are in a race against time, a time wherein ever complex cancer leads the worlds death cases (Cancer Research UK Website, 2016). We are at a unique juncture in history wherein highly efficient machine learning is being deeply genomics crunching big data, pacing personalization of medicine- only integrating medicine of all proven forms can do justice to the term "personal"

Conclusion

It's actually a beginning – a wider scale integration of advanced computerized systems into health care is to be designed. While the tech side of it can follow a top-down approach, only a standardization and perfection of the methods – both in Allopathic and (more) in Alternate forms of treatment. This should ideally come from the Health Departments. Parallel collaborative efforts between countries esp. with diverse population can lead to richer datasets. Only with rich accurate data can we build systems – AI & DL – that gives us faster and much more personalized treatments.

References

Alyass, A., Turcotte, M., & Meyre, D. (2015). From big data analysis to personalized medicine for all: challenges and opportunities. *BMC medical genomics*, *8*(1), 33.

'Jungle tulsi' shows anti-cancer properties. http://www.natureasia.com/en/nindia/article/10.1038/nindia.2016.77?WT.mc_id=FBK_NPG . retrieved on13 June 2016

Integrated Medicine: Amrita Hospital Website: http://www.amritahospital.org/SpecialityDepartments/integrated-medicine. retrived on 02 August 2016.

Coiera, E. (1997). *Guide to medical informatics, the internet and telemedicine*. Chapman & Hall, Ltd..

Yu, D., Deng, L., & Yu, D. (2014). Deep Learning Methods and Applications. *Foundations and Trends in Signal Processing, 7* (3-4): 1–199.

Kapiszewski, A. (2006). Arab versus Asian migrant workers in the GCC countries. United Nations Expert Group Meeting on International Migration and Development in the Arab Region. 15-17 May 2006

IBM Watson Health https://www.ibm.com/watson/health/ retrieved on 04 September 2016.

 Worldwide cancer statistics. Cancer Research UK Website http://www.cancerresearchuk.org/health-professional/cancer-statistics/worldwide-cancer, retrieved on 04 September 2016