



PROJECT:

Artificial Neural Network Protocol in Dermatology

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Introduction

Scientific literature shows that the use of Artificial Intelligence (AI) can contribute to better improve healthcare performance and quality of care. The current COVID-19 (caused by the virus SARS-CoV-2) pandemic has increased the need for, and opportunities to use AI within healthcare. Specialists on the subject believe that technologies that incorporate AI will transform the provision of health care in the next decade, and it is important to know their applications and challenges to be faced by professionals and users.

In 2019, researchers from the University of Brasília¹ developed a project called “***Artificial Neural Network Protocol in Dermatology***”, with its protocol aiming to validate a Convolutional Neural Network (CNN) for diagnosis purposes in an outpatient healthcare setting in Brazil.

The aim is to use this CNN as an alternative preliminary diagnostic system, based on photographic images instead of biopsy (invasive and risky procedure), in particular when screening initial patients, (being this face to face or by telemedicine).

¹ Faculty of Health Sciences, Institute of Chemistry, Faculty of Medicine, Hospital Universitário de Brasília and Department of Electric Engineering.

In this specific project, the researchers tried to answer the following questions:

- i. Can AI contribute to improve efficiency in screening, by reducing diagnostic time with a similar diagnostic accuracy, of pigmented lesions of skin cancer in the Brazilian population?
- ii. Will AI be of importance for Brazilian general practitioners and dermatologists to make faster and more accurate screenings without the need to use invasive methods, such as biopsy?

Due to the interdisciplinary nature of the project, a vast demographic of researchers was involved, including different disciplines and levels of seniority. The CNN is being trained to screen and discriminate skin pigmented cancer lesions from other associated benign diseases, using a set of dermatological photographic images from patients. Therefore, in order to construct a robust database to train this CNN, the researchers involved in this project, are building strong partnerships with Brazilian hospitals that have a large set of dermatological images.

It is expected that the use of CNN can also be expanded as a non-invasive technology, as it is a methodology that can be embedded in cell phones and "smartphones" allowing preliminary diagnosis to be made from photographic images, obtained at the time of screening in an outpatient health setting in Brazil. The ultimate impact is to reduce risks and costs, improve access to healthcare in remote areas and the integration of information into the Unified Health System database. In addition, this technology can be applied to other health conditions or management of the healthcare system health.

I-Workshop on Artificial Intelligence Applied to Health (I-WAIAH)

The project also resulted in specialized training of the involved members.

The I-Workshop on Artificial Intelligence Applied to Health (I-WAIAH) was envisioned to share the results of the project with the wider community and to foster the discussion about the importance of AI at the University of Brasília.

❖ **Date:** 6th and 7th October 2021

❖ **Time:**

- Day 1 - 6th of October: 9h-13h Brazil time
- Day 2 - 7th of October: 14h-18h Brazil time

❖ **Language:** Portuguese

OBJECTIVES

The I-WAIAH aims to disseminate the discussion of the applications of AI in the Health Sector, aiming to improve care safely and minimize the performance of invasive procedures in screening situations.

Specific Learning Objectives:

- Provide alignment between theoretical and experimental researchers in relation to the protocols developed for the research.
- Promote exchanges between researchers and student researchers.
- Present the advances already obtained by researchers from the groups involved in the project.
- Present the platforms and software to support data analysis.
- Discuss the challenges and guidelines regarding the creation and management of the database.
- Discuss about the potential of using AI in healthcare.
- Discuss the ethical repercussion in the use of artificial intelligence in healthcare.
- Present the concepts of database, artificial intelligence and neuronal networks.

TARGET PUBLIC

The target audience consists of a group of theoretical and experimental researchers formed by Engineers, Dermatologists, Nurses, Chemists and Physic-Mathematicians and undergraduate and graduate students.

EXPECTED RESULTS

Among others, it is expected to achieve the following results:

- Create networks of theoretical and experimental works.
- Promote exchanges between teaching researchers and students.
- Disseminate research carried out locally and nationally in this area of knowledge.
- Strengthen cooperation between emerging groups in this area of knowledge.
- Train specialized staff and graduate students.
- Promote short courses in AI and its applications in public health

Workshop Agenda:

The program proposes a series of lectures and open discussion sessions with the aim of defining the main concepts of AI, Artificial Neural Networks applied to Health and a mini-course about the experience of the project Artificial Neural Network Protocol in Dermatology.

PROGRAM - Workshop on AI applied to Health



Day 1 - 6th of October: 9h-13h Brazil time

<i>Time</i>	<i>Day 1 – morning</i>	<i>Speaker</i>
09:00 – 09:15	Introduction AI and the perspectives on health	Workshop/UnB Coordinator Dra. Maria Emília M.T. Walter Dean of Research and Innovation/UnB Dra. Luiza Madia (video), Regional coordinator TGHN
09:20 – 09:55	Public databases: challenges and approaches to determine an AI strategy.	Dra. Agma Traina (USP)
10:00 – 10:30	A mathematical model for 3D shape reconstruction from 2D skin lesion images	Dr. Kleber Carlos Mundim (IQ/UnB)
10:35 – 11:05	Clinical techniques and challenges in diagnosing dermatological lesions using AI	Dra. Ana Maria Pinheiro (UnB)
11:10 – 11:40	Can artificial neural networks support us to detect and classify stroke based on brain CT images?	Ms. Mateus Roder (UNESP)
11:45 – 12:00	Perspective and challenges of AI use in Nursing	Dra. Solange Baraldi (UnB)
12:05 – 12:20	AI in healthcare: in Brazil and in the world	Dra. Mary Ann Xavier (UnB)
12:25 – 12:45	Questions & Answers	Workshop coordinators
12:50 – 13:00	Closing session	Dra. Solange Baraldi (UnB) Mrs. Mercedes Rumi (TGHN Regional Lead)



Day 2 - 7th of October: 14h-18h Brazil time

<i>Time</i>	<i>Day 2 – afternoon</i>	<i>Speaker</i>
14 :00 – 14 :05	Welcome to day 2	Workshop coordinators
14:05 – 14:35	Challenges and, ethical and legal vulnerabilities in a world of AI, Big Data and Neural Networks	Dr. Fruzsina Molnár-Gábor (Heidelberg Academy of Sciences and Humanities, Germany)
14:40 – 16:10	Course: Methodologies in AI/neural networks in dermatology	Ms Hugo G. Machado (UnB)
16:10 – 16:35	Questions & Answers	Ms Hugo G. Machado (UnB) Dra. Ana Maria Pinheiro (UnB)
16:40 – 17:10	Impacts and perils of AI to the social service and health systems	Dr. Felix Hector Rígoli (USP)
17:15 – 17:45	Application of artificial intelligence algorithms to assist in the treatment of hepatic tumors	Ms. Murilo Venturin (UnB)
17:50 – 18:00	Closing session	Dra. Solange Baraldi (UnB) Mrs. Mercedes Rumi (Regional leader TGHN)