# EQUIPPING MEDICAL PHYSICISTS WITH ARTIFICIAL INTELLIGENCE KNOWLEDGE AND CODING SKILLS

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*Abstract* –

Artificial intelligence (AI) has been a promising tool to help us understand complex data patterns and able to recognize underlying data patterns for various applications. In the era of digital medicine and personalized medicine, medical physicists need to acquire basic knowledge of AI to communicate and collaborate with computer scientists. A recent global survey on the perception of medical physicists towards relevance and impact of AI indicated that there is an urgent need to equip them with both knowledge and skills of AI. This article documents our experience in conducting the 14th ACOMP workshop 'Getting started with Artificial Intelligence' at the 19th SEACOMP held in Bangkok, Thailand, Oct 22-23 2021. The workshop consists of didactic lectures and hands-on coding using Colab. Positive feedbacks were received that the participants benefited from the learning experience. We plan to conduct more of such workshops in the future.

*Keywords-* **Artificial Intelligence**, **Machine Learning, Digital Medicine, Coding, Medical Physicists**

## I. INTRODUCTION

The history of AI starts in 1950 and gained exponential interest in 2016 after it was announced that AI defeated the world GO champion, Lee Sedol. With the advancement of computational powers and the availability of digital data, AI has been showing promising feasibility in making clinical workflow more efficient and accessible [1].

A recent global survey of opinion on the AI role in medical physics from 1019 respondents representing 94 countries revealed that more than 85% of participants agreed that AI will have a significant role in medical physicists' clinical practice [2]. This highlighted the importance and urgency for medical physicists to equip themselves with AI skills. Medical physicists with AI knowledge and skills will enable them to foster better and more effective collaboration with their computer science and clinical colleagues in advancing healthcare.

Since the ASEAN College of Medical Physics (ACOMP) was formed in 2014, it has organised many workshops and courses [3]. During the 14th SEACOMP held in Bangkok, 21-23 October 2021, a hands-on two-day workshop, "Getting started with Artificial Intelligence", was orgaised (Figure 1). The objective of the workshop is to introduce the basic concepts and techniques of AI and provide hands-on coding experience to participants in using contemporary AI methods to solve practical problems.


**Figure 1 Workshop Poster**

## II. THE EXPERIENCE OF 'GETTING STARTED WITH ARTIFICIAL INTELLIGENCE'

This workshop on 'Getting started with Artificial Intelligence' consists of a two-day workshop of two-hour session each of didactic lectures and hands-on coding delivered by Universiti Malaya lecturers: Kwan Hoong Ng, Chu Kiong Loo and Shier Nee Saw. The topics covered in the workshop are shown in Table 1.

**Table 1 Topics covered in the two-day workshop**

| Topics |
|---|
| 1. Lecture:<br>a. Overview of AI in medicine<br>b. Introduction to Machine Learning Lecture<br>2. Hands-on Workshop:<br>a. Classification problem hands-on Workshop.<br>b. Regression problem hands-on Workshop<br>c. Develop machine learning model for medical problems |

In the first session, an overview lecture on AI in medicine and an introduction to machine learning were given. The lecture presented a brief history of AI, applications of AI in medicine, the concepts of machine learning including supervised, unsupervised learning and deep learning (Figure 2). Through these lectures, students gained a deeper understanding of AI.

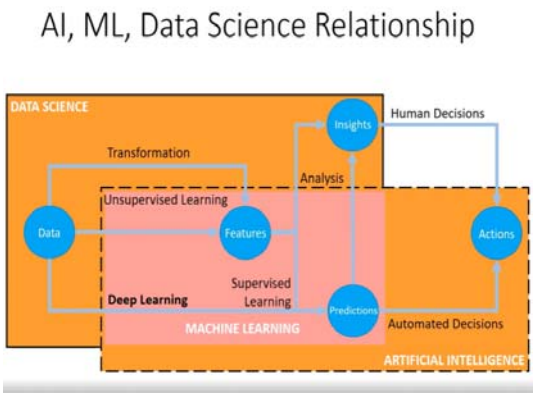


**Figure 2 An example of a diagram to describe the relationship between data, features, prediction, insights and actions in the AI context.**

The second session was hands-on in which the instructor guided the students to code in the Google Colab platform. Classification and regression lectures were given to enable students to grasp the concepts, followed by a practical session where students were asked to code in developing an AI model. After learning the concepts and examples, students were tasked to develop an AI model to classify whether the fetus is small or normal size (predict small-for-gestational-age, SGA babies). In this exercise, students were required to re-use the concepts and code learned in the workshop to create the AI model. The materials of the hands-on Colab coding workshop are available at https://github.com/shiernee/AI_Tutorial.

## II. DEMOGRAPHICS OF PARTICIPANTS, FEEDBACKS AND OUTCOME OF THE WORKSHOP

Sixteen participants from Thailand, Malaysia, Japan and the Philippines attended this workshop. According to the feedbacks, all participants said that they will recommend this workshop to others. The main reason was the workshop was well-paced and participants were able to follow through, the contents were relevant to them and suitable for those who are new to AI and Colab. Due to the COVID pandemic situation, the workshop was held online. Lastly, students requested to include more examples on imaging.

This workshop served to expose and equip students to learn the basic of AI and more importantly, the firsthand experience in coding. After the workshop, students can use the code, extending it to solve other medical problems and pave a path to combine this knowledge and practical skills in their job-related task and research.

## III. CONCLUSION

The 'Getting started with AI' in the 14th ACOMP has proven to be a great success introducing medical physicists to the realm of AI. The participants could now apply the knowledge and skills acquired in furthering their pursuit of AI. Furthermore, this workshop serves as a model for universities that are considering introducing AI in post-graduate programmes in medical physics.

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