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Fundamentals of Artificial Intelligence

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Abstract:- Artificial Intelligence AI can be simply defined as solving problems through automated algorithms. In this article, we define and explain the basic prerequisite skills of a future AI programmer and show how he can improve his abilities in the field of artificial intelligence programming. Finally, we use AI to test the correctness of the well-known theories of relativity and quantum mechanics introduced by the giants A. Einstein and E. Schrödinger more than a century ago. The numerical results are stunning because they show that the well-established theories of relativity and quantum mechanics are only partially true and contain inherent flaws.

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I. INTRODUCTION

For any given problem, there are too many different solutions and too many different approaches or workflow diagrams.

The basic classification of these approaches can be seen as falling into only two distinct categories:

- The old method where the solution results from processing the input data via the intelligence of the human brain (shown in Figure 1) which is expensive and time consuming.
- New AI artificial intelligence techniques (shown in Figure 2)

Which is more powerful, cheaper and less time consuming.

Note that there are several definitions of artificial intelligence (AI). ***The simplest and most rigorous definition of AI is solving problems using automated algorithms.***

The practical application of AI dates back to the days when the first primary computers operated with punch cards and vacuum tubes. At that time, humans were thinking and wondering what these computers could do when they become even more advanced, with larger memories and faster processors!

➢ *What Would this Mean for Humanity?*

Could they help us solve our biggest challenges, from climate change to global energy supplies, and food and water shortages?

In this article we define and explain:

- the basic prerequisite skills of a future AI programmer.
- How a beginner AI programmer can improve his abilities in the field of artificial intelligence with more knowledge about statistical transition chains such as Markov and B-matrix chains.
- Finally, we use AI to test the correctness of well-known theories of classical and quantum physics as well as mathematics.

These theories were introduced in the 20th century by the greatest scientists of the time and never tested before.

We emphasize once again that the main difference between the old way of thinking for decision making via a human meeting dealing with paper documents and the artificial intelligence method is the use of computer processing algorithms.

This means that the electronic input is processed by the computer processor to produce the required output data, as shown in Figures 1 and 2.

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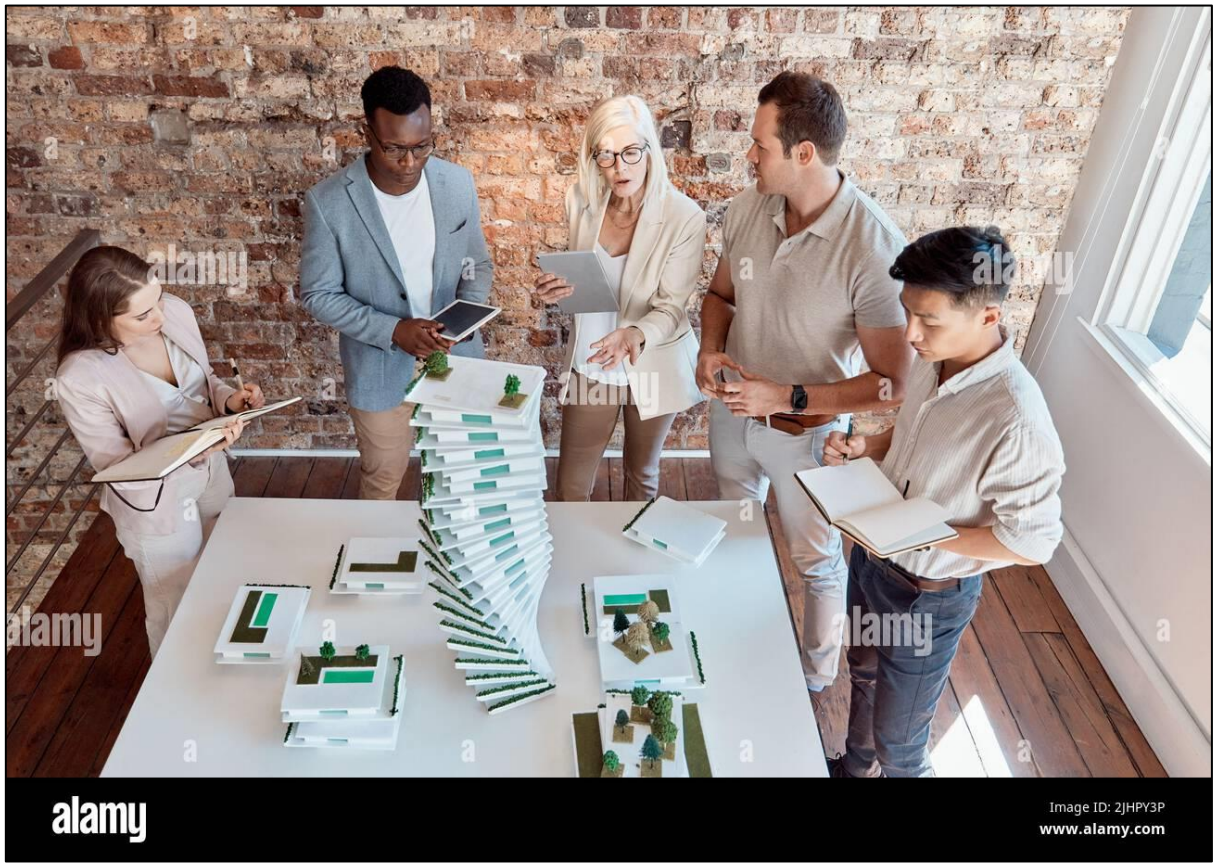

Fig.1- Input Data and Output Data are all the Documents and Data Processed from Input to Output by the Human Brain. (Google Search)

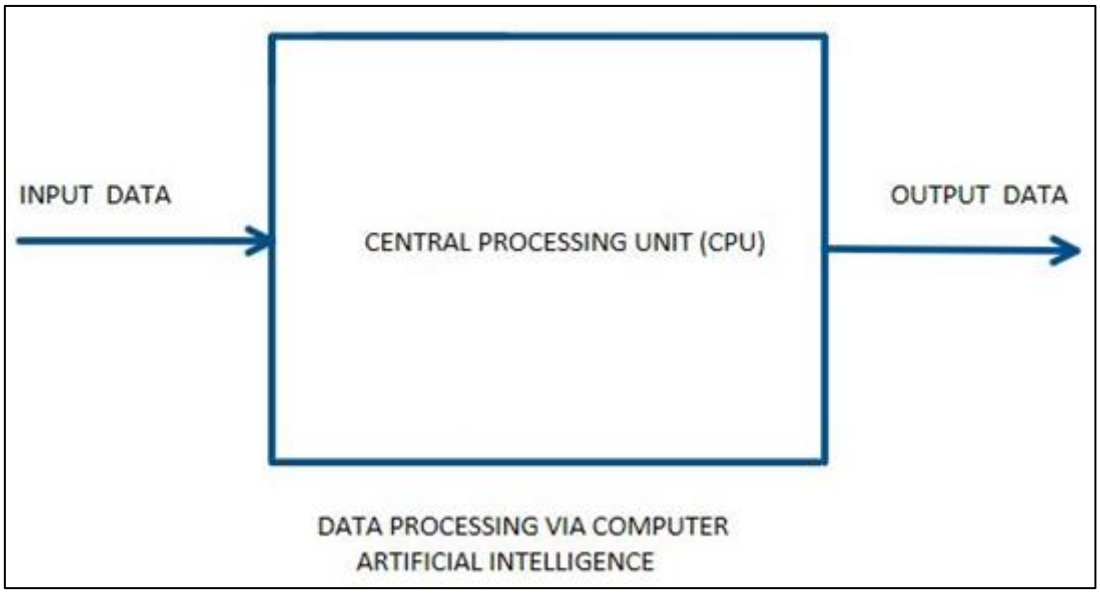

Fig.2- Input Data and Output Data Processed from Input to Output by Intelligent Algorithm through Computer Processor.

In order not to worry too much about the details of the sequence of introductory rules and hypotheses, let us move directly to the section titles and subtitles, definitions and practical applications.

In fact, the in-depth understanding of the following six subheadings (2-7) is necessary to clarify our problem and essential for any future AI programmer.

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II. PREREQUISITE SKILLS OF A FUTURE AI PROGRAMMER

The question arises: what are the basic skills of an AI programmer?

First of all, the human who chooses to work in AI to find solutions to the world's major problems must be exceptional or one of the best [1].

By one of the best we mean, in addition to high intelligence, high activity, that he must have excellent knowledge.

We recommend the following knowledge:

- Fortran or C++ programming language
- Linear algebra, complex analysis and probability and statistics.
- Statistical transition matrix chains such as Markov chains and/or B matrix chains of Cairo techniques.
- Basic universal laws in physics.

III. STATISTICAL TRANSITION CHAINS

Today we only know two statistical transition chains, namely the well-known Markov chains and B-matrix chains. They require a better physical and mathematical knowledge of certain basic terms,

- Theorems on closed volume and closed surface.
- Dirichlet boundary conditions.
- Source/sink term.
- Theorems on the closed control volume such that, Conservation of total energy and entanglement of energy density.
- Transition probability and resulting statistics.

We believe that statistical transition chains are one of the best tools for generating effective artificial intelligence programming.

IV. HOW DOES AI WORK?

➢ *Terms and Definitions*

Most AI relies on a process called machine learning to develop complex algorithms that constitute its ability to act intelligently.

There are other areas of AI research, such as robotics, computer vision, and natural language processing, which also play a major role in many practical AI implementations, but the underlying training and development always starts with machine learning and computer algorithms.

This means that companies and scientific theories will be more successful in adopting AI if they have more existing input data, regarding boundary conditions and source term queries. . . etc, for training.

Machine learning occurs when computers (machines) extract information from the input data they are trained on, and then begin to develop new information based on that.

The computer receives a massive set of data, trained in various ways by humans, and then learns to adapt based on that training.

Deep learning is part of machine learning, a “deep” part, in the sense that computers can operate even more autonomously, with less help from humans. The massive data set the computer is trained on is used to train a deep learning neural network: a complex, multi-level, weighted algorithm modelled after the human brain.

This means that deep learning algorithms can process information (and other types of data) in an incredibly advanced, human-like way, even if they never existed before.

V. GENERATIVE AI

Generative AI is a type of artificial intelligence that can create new content, such as text, images, music or even videos, based on patterns learned from existing data.

It works using advanced algorithms, often involving neural networks, to mimic human creativity. For example, it can write stories, generate artwork, or produce realistic voices. The concept has been around for decades, but recent advances, like GPT, have made it much more powerful and accessible, allowing users to use it for tasks like writing, designing, or even brainstorming new ideas.

VI. TRADITIONAL STATISTICS VS. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

This is a striking example of confusion between traditional statistics and artificial intelligence when the latter is poorly defined or misunderstood.

Just because they process data statistically doesn’t mean they are the same.

Traditional statistics had been around for over a century, long before the invention of modern computers.

However, the fact is that, unlike artificial intelligence (AI) and machine learning (ML), traditional statistics is not a new technology and, more importantly, it uses human intelligence (Fig. 1) and not the algorithmic intelligence of machines (Fig. 2).

Some engineers and companies, particularly in the mining and oil and gas industry, refer to linear regression as machine learning and believe that these two technologies are the same. When they refer to "data analytics", they are mainly referring to linear or non-linear regression or multivariate regression and trying to treat them as a new technology. Often, people who make such mistakes, intentionally or unintentionally, also try to view these

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traditional and old technologies as something new in the modern industry.

The problem is, when vendors, service companies, startups, or even operating company engineers as data scientists fail to get the results they promise, they either blame AI and ML, or they try to reuse and combine traditional mathematical formulations of their own.

Understanding the physics of input data and the physics of otput data which in general have the same nature is important.

Once again, it should be remembered that the use of traditional statistical approaches dates back to the early 1960s, when there were no modern computers using AI algorithms.

VII. IS IT POSSIBLE FOR AI TO CHALLENGE SOLID AND WELL-ESTABLISHED THEORIES LIKE PDE, QUANTUM MECHANICS AND RELATIVITY?

- We assume that this has already been happening effectively and rigorously since 2020 [2].
- The year 2020 is the birth date of the numerical statistical theory called Cairo techniques and the resulting B-matrix chains.
- The author of this article recently (2020) developed a new statistical artificial intelligence technique called the statistical theory of Cairo techniques.
- The statistical theory of Cairo techniques concerns the spatio-temporal distribution of the unitary 4D x-t energy density distribution via an adequate algorithm produced by the author.
- This is a theory of artificial intelligence in the true sense of the word.
- The theory of Cairo techniques proved more efficient and less time consuming in numerically solving Poisson and Laplace time dependent PDE [2]
- The same theory of Cairo statistical techniques on 4D unit space explained the formation and explosion of the Big Bang millions of years ago [3].
- Cairo's techniques and the resulting B-matrix AI could explain the theory of reverberation time and loudness in audio rooms for the first time in 100 years [4,5].
- Once again, the Cairo techniques and the resulting B-Matrix AI could explain Einstein's theory of relativity as well as Schrödinger's theory of quantum mechanics more effectively than ever before. They were able to identify the incompleteness and defects of the two theories [6,7,8,9].
- Furthermore, the Cairo techniques and the resulting B-Matrix AI were able to numerically evaluate the finite 1D, 2D, 3D integral in an accurate and efficient form and showed that artificial Lagrange multipliers are not necessary [10].
- It is worth mentioning that many of our respectable contributors and readers frequently ask how do you judge and correct the scientific work of the giants A. Einstein and E. Schrödinger?
- Does this mean you are smarter than both of them?
- The answer is that when using the Cairo techniques and its B-matrix algorithms, it is the artificial intelligence of the Cairo techniques and its B-matrix algorithms that is smarter than A. Einstein and E. Schrödinger and not the author himself.

VIII. CONCLUSION

- In this article, we explain the basic prerequisite skills of a future AI programmer and how he can improve his abilities in the field of artificial intelligence programming.
- We use Cairo Theory of Techniques AI and its B-matrix chains to solve time-dependent PDEs and numerically evaluate 1D, 2D, and 3D finite integrals.
- We also test the correctness of the well-known theories of relativity and quantum mechanics introduced by the giants A. Einstein and E. Schrödinger more than a century ago.
- The numerical results are stunning because they show that the well-established theories of relativity and quantum mechanics are incomplete, partially true and contain inherent flaws.
- It is the artificial intelligence of the Cairo techniques and its B-matrix algorithms that is smarter than A. Einstein and E. Schrödinger and not the author himself.

NB. The author uses his own double precision algorithm, such as that of references 11-12-13. No ready-to-use Python or MATLAB algorithms are needed.

REFERENCES

[1]. I. Abbas, A three-dimensional classification of humans - A more tolerant world, ResearchGate, IJISRT journal, January 2025.
[2]. I. Abbas, A numerical statistical solution for Laplace and Poisson PDE, ResearchGate, International Journal of Innovative Science and Research Technology, October202
[3]. I. Abbas, Quantum buzzle, vacuum dynamics and the Big Bang, ResearchGate, International Journal of Innovative Science and Research Technology, June 2024.
[4]. Theory and design of audio rooms -Physical formulation, ResearchGate, International Journal of Innovative Science and Research Technology, June 2024, August 2024
[5]. 1-I. Abbas, Theory and design of audio rooms-Reformulation of the Sabine formula, ResearchGate, IJISRT review, October 2021.
[6]. I. Abbas, A rigorous reformulation of Einstein's derivation of the special theory of relativity, ResearchGate, IJISRT journal, February 2022.
[7]. I. Abbas, A statistical derivation for Einstein's relativity, ResearchGate, IJISRT journal, January 2025.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14959355

[8]. I. Abbas, Is unified field theory Schrödinger's wave equation or its square? A unitary spatio-temporal vision, July 2024 ResearchGate, International Journal of Innovative Science and research Technology, Oct 2024.1
[9]. I. Abbas, Useless quantum mechanics-The complex and untold story, ResearchGate, International Journal of Innovative Science and Research Technology, November 2024
[10]. 9-I. Abas, Effective unconventional approach to statistical differentiation and statistical integration, ResearchGate, International Journal of Innovative Science and Research.
[11]. I. Abbas, How to transform B-Matrix chains into Markov chains and vice versa, ResearchGate, IJISRT review, December 2020.
[12]. I.M. Abbas et al, A critical analysis of the propagation mechanisms of ionizing waves in the event of a breakdown, I Abbas, P Bayle, Journal of Physics D:Applied Physics13 (6),8-
[13]. I.M. Abbas et al, IEEE.1996, Pseudo spark -discharge, Plasma Science Transactions 24(3):1106 - 1119,DOI:10.1109/27.