# III. Artificial Intelligence

Artificial Intelligence (AI) is one of the newest fields in science and engineering and currently covers a huge variety of subfields, from the more general, as learning and perception, to the specific, such as playing chess, proving mathematical theorems, driving a car and diagnosing disease. AI is truly a universal field that aims not just to understand but also to build intelligent entities [9].

1. Brief history

The beginnings of AI can be traced to philosophy and fiction, while early inventions in electronics, engineering and many other disciplines have greatly influenced the path of AI. Some early milestones include work in problem solving, including basic work in learning, knowledge representation and inference as well as programs in language understanding, translation, theorem proving, associative memory and knowledge-based systems [10].

AI sits at the intersection of a number of important disciplines, listed in Table III.1 below, each of them contributing in some way to the development of this field. In its formative years, AI was influenced by ideas from many fields of study. These came from people working in engineering(such as Wiener’s work in cybernetics), biology(Ashby, McCulloch and Pitt’s work on neural networks in simple organisms), experimental psychology, communication theory, game theory(notably by von Neumann and Morgenstern), mathematics and statistics, logic and philosophy(for example, Church and Hempel) and linguistics(such as Chomsky’s work in grammar) [10].

These areas made their mark and continue to influence this field of study, but after having assimilated much, AI has grown beyond them and has, in turn, occasionally influenced them back [10]. Only in the last half century computational devices and programming languages have become sufficiently powerful to build experimental tests of ideas about what intelligence is.

**Table III.1.** The disciplines and the personalities that lead to the development of AI

by finding answers to important questions [9]

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| Discipline | Questions | Personalities |
| Philosophy | * Can formal rules be used to draw valid conclusions? * How does the mind arise from a physical brain? * Where does knowledge come from? | Aristotle  Leonardo da Vinci  Wilhelm Leibniz  René Descartes  Rudolf Carnap |
| Mathematics | * What are the formal rules to draw valid conclusions? * What can be computed? * How do we reason with uncertain information? | George Boole  Kurt Gödel  Alan Turing  Steven Cook  Thomas Bayes |
| Economics | * How should we make decisions so as to maximize payoff? * How should we do this when the payoff may be far in the future? | Adam Smith  John von Neumann  Richard Bellman  Herbert Simon |
| Neuroscience | * How do brains process information? | Hans Berger, Camillo Golgi, Santiago Ramon y Cajal |
| Psychology | * How do humans and animals think and act? | H. Helmholtz, F. Bartlett, K. Craik, N. Chomsky |
| Computer Engineering | * How can we build an efficient computer? | J. Eckert, C. Babbage, J.M. Jacquard |
| Control theory and cybernetics | * How can artifacts operate under their own control? | N. Wiener, W.R. Ashby |
| Linguistics | * How does language relate the thought? | B.F. Skinner, N. Chomsky |

1. Types of algorithms
2. Domains of application
3. Applications in bioinformatics

[9] Russel, S.J., Norvig, P.: Artificial Intelligence, A Modern Approach, Third Edition, Prentice Hall, New Jersey, 2010.

[10] Buchanan, B.G.: A (very) brief history of Artificial Intelligence, AI Magazine, 4(2006), 53-60.