BTech in AI

Philosophy

Artificial Intelligence (AI) is an area that spans multiple disciplines and impacts almost every sphere of life. It is widely agreed that AI has the potential to have a large impact on "the human condition", making it imperative that engineers of tomorrow are trained in the scientific, engineering, as well as sociological aspects of AI. AI, by its nature, is a multidisciplinary subject, both in terms of the set of techniques needed to develop it as well as the set of fields it has interactions with. Broadly speaking, we can understand it as the study of strategies that harness data collection and computation in order to enhance and empower human capabilities. While statistical and computational techniques form the core of any AI subfield, the importance of domain knowledge cannot be underestimated. Our designed curriculum is based on the following principles:

1. It provides a solid foundation for the basics in AI, from both the computational as well as statistical perspective. While students do not need a view into all aspects of computer science, they need enough exposure to identify, e.g. what are the hard problems in AI and why, and what engineering is involved in an implementation of AI algorithms.
2. The curriculum is designed to be flexible to adapt to a rapidly changing field.
3. The curriculum is designed to give students enough leeway to specialize in any of the subfields of AI, i.e. students should be able to train themselves in the relevant AI techniques, choose a domain, and then use the AI techniques to synthesize novel questions and applications in their domain of interest.

Over the last few years, the number of faculty in different disciplines working on applications of AI in their respective domains has significantly increased. Familiarity with AI concepts, to various extents, is in high demand both in the industry as well in the government sector. It is therefore proposed that a major in Artificial Intelligence be established at the Institute.

Constraints:

1. Discipline Core Courses - 44 credits
2. Discipline Elective Courses - 20 credits. This consists of the following baskets.
   a. Advanced AI basket,
   b. AI application basket,
   c. CSE elective basket.

AI techniques to synthesize

Core Courses

The discipline-specific curriculum consists of the following core courses.

Course code	Name	Credits
ES 242	Data Structures and Algorithms -1	4
ES 203	Digital Systems	4
CS 301	Theory of Computing	4
ES 215	Computer Organization & Architecture	4
CS 2xx (to be proposed)	AI Software Tools and Techniques	4
AI/CS 2xx (to be proposed)	Mathematical Foundations of AI	4
ES 654	Machine Learning	4
To be proposed	Signals, systems and random processes	4
EE xxx	(Electrical) Control Systems	4
CS 328	Introduction to Data Science	4
To be proposed	Foundations of Artificial Intelligence	4
Total	44	

Elective structure

Electives are divided into the following three baskets. 20 credits of electives must be taken. The "advanced AI" and "AI cluster" baskets are just a guiding structure. There is no constraint on the minimum number of credits from these two baskets