ECIII/ECSI 3206:
Artificial Intelligence [and expert systems]
Topic 1: Overview of A.I

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Course Pre-requisites

- Basics of computing/computer Science
- Basics of statistics
- Basics of data structures and algorithms
- Basics of Discrete mathematics
- Basics of programming

Topics breakdown

1. Introduction to A.I
2. A.I agent and Multi-Agent Systems
3. Search Algorithms and problem Solving
4. Logic (propositional and predicate calculus) and Truth tables
5. Fuzzy logic and fuzzy logic systems
6. Artificial Neural Networks[ANN], Machine Learning and Deep learning
7. Expert Systems[MYCIN]
8. Natural Language processing[NLP]
9. A.I programming Languages[PROLOG, Python for A.I]

Introduction to AI

- Intelligence-ability to reason , calculate, learn from experience , adopt , use language, store and retrieve information from memory.

- Artificial intelligence-intelligent machines that act and think like human beings

- Machine learning-Intelligent systems that learn things without being programmed to do so

- Deep learning-Intelligent systems that think like human brains using Artificial Neural networks[ANN]

Introduction to AI

- AI-branch of science which deals with helping machines find solutions to complex problems in a human like manner

- It invovel borowing the characteristics of human intelligence and applying them as algorithms in a computer friendly manner.

- Characteristics of human intelligence include things such as Reasoning , leaning, problem solving Perception e.t.c

Fields Contributing to A.I

- Biology
- Philosophy
- Mathematics
- Psychology
- Computer science
- Sociology

General/real world applications of AI

- Game playing
- Speech recognition
- Natural Language processing(NLP)
- Computer Vision
- Expert systems
- Hand writing recognition
- Intelligent robots
- Consumer marketing
- Identification technologies
- Intrusion Detection Systems
- Machine Translation

History Of AI (from a discipline perspective)

- Philosophy[theories of implication and what is considered right(Aristotle and Socrates)]

- Mathematics[logic, calculus, Boolean algebra]

- Biology[Neural networks and Neural science]

- Computation[turing test and von Neumann architecture]

- Psychology[how the human mind operates and how we process infor.]

- Evolution[Charles Dawin's theories of survival for the fittest]

- Cognitive science[systems that can learn and interact with their environment]

Components of intelligence

1. Reasoning
2. Learning
3. Problem solving
4. Perception
5. Linguistic understanding
6. Knowledge acquisition

1. Reasoning

- Its what provides bases for judgment
- Types of reasoning
  - **Inductive reasoning**[Use observation to make broad general statements]
  - **Deductive reasoning**[Start with a general statement and examine all possibilities so as to come up with a logical conclusion]

2. Learning

- It is the activity of gaining knowledge
- Types of learning
  - Auditory
  - Episodic
  - Motor
  - Observational
  - Perceptual
  - Spatial
  - Stimuli response
  - Perceptual

3. Problem Solving

- It is concerned with decision making

- In computing , we solve achieve this through the Searching Techniques

4. Perception

- Process of acquiring ,then interpreting , then Selecting and finally organizing sensory information.

5. Linguistic understanding

- Knowledge on how to use a language

Kuwamocho – Drinkng
Wolan/Wagwan – Yes/Ok
Madenge – Girls
Kushikisha – Chewing Miraa
Niko wire – I'm broke
Nauwo – Understand / Know
Niko machingli – I'm rich
Kuwa mawenge – Being horny
Mochoka – Come
Buda / Mzing – Father
Mongre – Brain
Wabbling – Water
Medi – Meditate
Kubuya – Being afraid
Zimenice – Feeling high

6. Knowledge acquisition

- Data Vs Information Vs Knowledge
- Ability to synthesize new knowledge

Types of Intelligence

- Linguistic
- Musical
- Logical/mathematical
- Spatial
- Kinesthetic/Bodily
- Intrapersonal
- interpersonal

Difference between Human and machine intelligence

- Human perceive patterns while machines perceive rules and algorithms

- Humans store and recall information while machines Use search Algorithms

- Humans can figure out missing parts of information but machines do not do this very well.

Perspectives of A.I

- Intelligence perspective[aims at making machines act like human beings i.e Turing test]

- Business perspective[Review of tools used for solving business problems]

- Programming perspective[Study of symbolic programming , problem solving and searching using programming languages]

Task classifications of A.I

- Formal tasks[math, geometry, logic games]
- Mundane task[ordinary tasks that humans learn since birth]
- Expert tasks[engineering, scientific analysis , medical diagnosis]

Research areas /fields in A.I

- Neural networks[brain models and pattern recognition]
- Expert systems[autopilot/self navigation systems]
- Robotics[autonomous machines(robo cup)]
- Fuzzy logic systems[Electronics controls
- Natural Language processing[machine translation]
- Speech recognition[Siri, Alexa]
- Computer vision[object recognition]
- Evolutionary computation[genetic algorithms]
- Machine learning