INTRODUCTION

In this essay I am going to address the overview of the course happened and how this course helped me in understanding the basics of Machine Learning. That was August 19th 2015, the day on which we enrolled in the classes for first semester. And I decided to take Artificial Intelligence under Dr. Richard Min as my guess is that this course will definitely help me to gain basics of Machine Learning. And fortunately I got a good registration number and I was the first one to take this course on that day. I felt very happy for what has happened. And my classes started and the best thing with this course is that we the students are having weekly activities and quizzes. By which we learn a lot of things constant hard work is must to get good scores. Professor Richard Min has a very good experience and he knows how to teach, what to teach and when to teach. In this course we learned the basics of LISP, PROLOG and ASP, which will definitely add some weight to my resume. The tools, PROVER9, WEKA, AIIMA, we learned in this course helped me to understand the importance of Artificial Intelligence. Through the videos, essays and Research papers I understood the basics of Artificial Intelligence and the present trends in Artificial Intelligence. And I am going in detail on the essays and videos that we have learned so far in this course.

DARPA ROBOTICS CHALLENGE-[ <https://www.youtube.com/watch?v=g0TaYhjpOfo>]

The video is about DARPA 2015 robotics challenge. We find most robots participating in the challenge fail in the first step. The challenge progressed to the final round with two teams, IHMC Robotics team and Team kaist (Korea Humanoid robot), fighting for the first position in the challenge.

The challenge in the final round is to complete 8 tasks, a human can do, efficiently in time. These robots use sensors to detect obstacles. Almost 200 commands/second were executed in order to run the robot. IHMC team was a 24 members team at last , with almost 100 members at a point of time. The movements of the robot are similar to a human. As the competition is for humanoid robots, team members mainly concentrated on the movement of robots. And the robot accomplished the challenge in 54 minutes 21 seconds. The other robot from team kaist also accomplished all the tasks in 48 minutes. So the winner is Team kaist.

In my view the reason behind the success of kaist team is they just concentrated on the tasks but not on the movements of the robot and the reason for the loss of Ihmc team is they thought that a humanoid robot should has the movements like human. And instead of that if they concentrate more on tasks then they would have accomplish the task earlier than kaist team.

Through this video I came to know the current trends in Robotics and the key role Artificial Intelligence is playing in building an efficient Robot.

BRAIN COMPUTER INTERFACE- [<http://www.cbsnews.com/news/harnessing-the-power-of-the-brain/>]

It is about understanding the human brain and mobility from the brain signals. Whenever we think, move or feel small electric signals are passed from neuron to neuron. Using this mechanism, we can help paralyzed people to communicate. As we know that they can’t move or feel as the signals from the brain are not sent to their parts of the body. In this project, they have considered a person who was normal in the early stages of his life but lost his ability to speak or feel or even any physical action now. Electronic chip is used for reading the electric signals in the brain and understanding what they think. Wires are connected all over the surface of the head in order to consider all the electric signals from neurons. The system interprets word by word. As it takes time for understanding the brain signals and interpreting the words, the machine performance would be slow. This device is really a revolution device to help the physically handy capped people. In order to make an improvement to this device we need to take care of the timing factor that is to make the device display the sentence as fast as the normal human being think.

Through this I came to know how an Artificial Intelligence can be build for a machine.

IBM CHALLENGE MAN VS MACHINE

This video is about “JEOPARDY. The IBM Challenge”. It was a game played by ken, Brad individually against an IBM system which is Watson. The first round of the game is Alternate Meanings, and at the end of first round it was in a tie with Brad (5000$). The next round was Double jeopardy in which Watson performed very well and stood in the First place with a score of $36,681. The last part of the double jeopardy was very hard for the programmers as the questions are very tricky also it needs them collect pieces of information from different places. For the question of cities both ken and brad were right but Watson came out with a wrong answer. This was because Watson was not dealing with structured data and also there are many cities in US with same name (Toronto). The questions also come from not form just one category but many which makes with more difficult. The way Watson treats with these questions is not the same as a human being does.

In the final round of the game questions were too tough that Watson was taking more time to answer. Ken and Brad were answering in just seconds while Watson took 2.5 - 3 seconds to answer which shows how powerful the human brain is. The game came into a stage that Watson can win only if it answers the doubling question to go into lead. It also knows that it should not take a risk and loose the lead. Finally it won the correct final answer.

This was not just a machine which plays jeopardy but it was a deep research in deep analytics, Machine Learning, Natural Language understanding, teach to itself how to solve problem. This is going to evolve as a very important tool in future computing.

Through this I came to know that how strong we can build a machine with artificial intelligence that can even competes with the world class performers. This helped me to understand the power of machines and automation of work.

GOOGLE SELF DRIVING CAR PROJECT

Complete Automation of driving is the main motive of the google self-driving car project. Automation will improve road safety as machines work more efficiently. It also helps a lot of people, handicapped, who can’t drive. The cars are designed in such a way that pressing a single button it will take you to go where ever you want. Many people feel this very comfortable as there is no need to concentrate on the driving. Different people in this video expressed their views and happiness on this break-through. Automation software should be tested thoroughly before introducing the cars on to the roads or else it may cost many lives. Also the sensors used to drive should be in perfect condition and the accuracy matters a lot. Accuracy and precision can be accomplished through a series of well-defined tests. Fully Autonomous driving is achieved through this project by Google. These vehicles will be very useful in nearby future, especially in developed nations. Although development does not matters to need. Google Self Driving Car Project will be very useful for each and every person. Governments should encourage those projects that are quite useful to mankind and Google Self-Driving is one of them.

Through this project I came to know the pros and advantages of automated machines that has some intelligence with them.

UNLOCKING THE ORIGINS OF MORALITY

Babies help unlock the origins of morality. Psychologists at infant cognition center at yele, also known as baby center, tries to find the origins of morality using babies. To find the exact behavior of babies they played a puppet show in front of babies. The puppet show was played with 3 puppets. One of them trying to open a box, out of the other two one helps in opening box and other one tries in an opposite way as the puppet opening the box. And to know the response of babies they kept both the good puppy and bad puppy in front of babies. Almost 80% of the children choose good puppies. Three month babies can’t choose directly so they stare at good puppies.

Also, they found an interesting fact that babies want to punish the unlikely one. And they mostly like similar ones to them. And they don’t like dissimilar things. An interesting fact found from the test among children of higher age who are educated, they try to share things equally with their companions as much as possible. This shows that babies has some decent idea in judging good and bad on the other hand they want to punish the unfamiliar things which is not a great scenario. Finally, we can say that babies have some knowledge of good and evil from their infant stage.

With this essay we can understand the origins of mortality which in turn will help us to create a better artificial intelligence for the system.

NEW ERA FOR NUEROSCIENCE

With support from the National Science Foundation (NSF), neuroscientist and psychiatrist Karl Deisseroth and his multidisciplinary team at Stanford University have developed a new imaging technology that essentially makes the brain transparent. The connections between neurons in the brain are involved in everything we do, and no one's pattern is the same. They chemically dissolve the opaque tissue in a post-mortem brain, and in place of that tissue, they insert a transparent hydrogel that keeps the brain intact and provides a window into the brain’s neural structure and circuitry. They can then generate detailed 3-D images that highlight specific neuronal networks.

Clarity is the study of circuitry of the brain by chemically dissolving the white opaque tissue. To develop a brain artificially first we have to know how a brain work and its composition. Learn how things are connected to each other. Neuron is the basic component of brain, dendrites in receive inputs from all over the brain and sends electric impulse to the respective organ which results in the performing an action. Clarity is a new window which helps for the advancements in medical sciences and this helps us to know the functioning of heart, spinal cord and other organs .This will help to know the Neural Network clearly. Mainly how human thinks and acts accordingly in the day today life. This will even be helpful to make the robots think like human in all aspects.

This video helped me to understand the current trends of artificial intelligence in Nueroscience. This shows the Inter Disciplinary nature of Artificial Intelligence.

Infinite Computation, Co-induction and Computational Logic

Co-induction provides the foundation for the lazy programming evaluation and type inference in functional programming. Co-induction is a technique for defining and proving properties of systems of concurrent interacting objects. It can be used as a proofing technique to show that an equation is satisfied by all possible implementations of such a specification. In general we use co-recursive functions along with lazy evaluation in Co-induction programming. Inductive definitions have 3 components: initiality, iteration and minimality.

Co-induction has been incorporated recently in logic programming in a semantic way. The traditional declarative semantics and operational semantics of logic programming is extended by co-inductive logic programming to allow reasoning over infinite and cyclic structures and properties. Co-inductive logic programming allows programmers to manipulate and work on infinite structures. As a result unification equations such as X = [ 1 | X ] is allowed in co-inductive logic programming.

Co-inductive Logical programming gives an operational semantics to declarative semantics that is based on greatest fixed point. Many believe that combination of inductive and co-inductive logic programming allows one to implement any desired LP semantics. But still they didn’t answer many problems yet.

Finally, this research paper on Co-induction by Dr. Richard Min and Dr. Gopal Gupta is a new era in co-induction Logical Programming.

A Computing Procedure for Quantification Theory

This paper mainly look at modern methods of representing the internal structure of quantification theory. In addition to the symbols in propositional calculus quantification theory employs special symbols for individual constants, predicate constants, individual variables and quantifiers. Individual constants represent particular individual things. Predicate constants represents specific predicates. Individual variables are employed to refer to any predicate generally. Quantifiers are logical operators that signify the range of individuals to which individuals apply.

The four Quantification rules dictate the conditions under which a quantifier can be deleted or added are: Universal Instantiation, Universal Generalization, Existential Instantiation, Existential Generalization.

Replacement of Existential Quantifiers by Function Symbols: The existential quantifiers in a prenex formula can be replaced without any inconsistency by functional symbols.

The complete algorithm has some steps to follow they are:

Step-1: Generate one or more quantifier-free line.

Step-2: Apply the rule for eliminating one-literal clauses.

Step-3: Apply the affirmative negative rule to the formula obtained at step2.

Step-4: Eliminate the first atomic formula from the first clause of minimal length in the formula.

Co-inductive Logic Programming and its Application to Boolean SAT

Co-induction logic programming extended with negation has many applications in Answer set programming. As we studied earlier the co-inductive logic programming solves many problems of infinite processes. But still there exists many problems, co-induction with negation results in many more applications.

Before talking about Co-inductive SDNF let us talk about Co-inductive SLD resolution, SLD resolution extended with the co-inductive hypothesis is known as CO-SLD resolution. CO-SLD resolution extended with the negation is known as CO-SLDNF resolution.

Co-inductive ASP solver mentioned in the paper has the following advantages of,

It works with ASP containing First order predicates with no restrictions placed on it.

It eliminates preprocessing.

It directly executes the predicates.

Finally, in this paper the author showed how co-SLDN resolution is used to develop Boolean sat

Solvers. Also goal-directed execution mechanisms are possible through co-SLDN resolution.

Answer Set Programming by Vladimir Lifschitz

ASP is a form of declarative programming oriented towards difficult, primarily NP-hard, search problems. ASP is a form of declarative programming oriented towards difficult search problems.

Asp consists of rules similar to Prolog rules. But the computational mechanisms used in ASP are different as they are based on fast satisfiability solvers for propositional logic. ASP is based on the stable model semantics of logic programming which applies ideas of autoepistemic logic and default logic to the analysis of negation as failure.

Answer set programming has been applied to several areas of science and technology. Here are three examples.

**Automated Product Configuration** The early work in this area mentioned in the introduction has of languages and to historical analysis of parasite-host systems led to the creation of a web-based product configurator web-based product configurator some planning and diagnostic (Tiihonen et al. 2003). This technology has been commercialized.

**Decision Support for the Space Shuttle** An ASP system capable of solving area mentioned in the introduction has led to the creation of a web-based product configurator for reconstructing a phylogeny for a set of taxa has some planning and diagnostic tasks related to the operation of the Space Shuttle (Nogueira et al. 2001) has been designed by a group led by Michael Gelfond, one of the creators of ASP, in collaboration with Matthew Barry of United Space Alliance.

**Inferring Phylogenetic Trees** An ASP-based method for reconstructing a phylogeny for a set of taxa has been applied to historical analysis of languages and to historical analysis of parasite-host systems (Brooks et al. 2007). The group of authors includes a zoologist, two linguists, and two specialists on answer set programming.

In conclusion, we learned a lot in this course about Artificial Intelligence. In this course we learned the basics of LISP, PROLOG and ASP, which will definitely add some weight to my resume. The tools, PROVER9, WEKA, AIIMA, we learned in this course helped me to understand the importance of Artificial Intelligence. From the videos, essays and Research papers I understood the basics of Artificial Intelligence and the present trends in Artificial Intelligence. And I am going in detail on the essays and videos that we have learned so far in this course.