**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>]

Many robots lost their balance and collapsed to the ground at different task points in the DARPA robotics challenge held on 05/06/2015 UTC. Although the robots were fine with little damage and can be rebooted. ihmc fell two times near the final point. But still it’s hard to make a machine to walk and run.

Next in the third and final round different robots had participated to win the prize competition. There were different tasks like:

To drive a car avoiding obstacles and to get out of car.

To travel across and open a door.

To remove electric plug.

To turn a valve near a leaking pipe.

To break a concrete panel using a tool.

To climb steps.

IHMC focused on the study of walking and balancing of robots as said by Douglas Stephan, Reasearch associate,ihmc. Ihmc robotic completed the task in 50:26 and won the second prize.

Team kaist won the first prize by completing all the tasks in 44:28 and took US $2 million. It is an korea based Humanoid DRC-HUBO. I thought that they made the things easier by keeping wheels on the knees of robot which inturn reduces the time to reach different points.

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 an marvellous idea- a wheel chair controlled by the brain signals, it can change the lives of physically disabled people and develops their ability of thinking. People who are physically disabled can think efficiently, but their limbs and some other organs cannot move and function. Their brain centres of memory thinking and judgement can work effectively but their control of posture movements of upper and lower limbs may lost. Because brain is receiving sensory information but motor pathway is paralysed.

In such a condition a device which can receive the brain signals and decisions is developed. It looks similar to wheel chair but it can change the lives of the disabled people by helping in protecting themselves. This device receives information in the form of brain signals and work without pressing a button or without a voice or without any movement of limb. Suppose we are watching two different objects which are flashing with different speeds one with 10 times per second other with 15 times per second we can concentrate any one of them basing on the number of oscillations per second in the brain so that the wheel chair can move either left or right. With the help of this technology a disabled person can move where ever he wants to go and helps to improve the quality of life.

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

**IBM CHALLENGE MAN VS MACHINE** - [<https://www.youtube.com/watch?v=lI-M7O_bRNg>]

An IBM computing system named Watson, competed against the world’s best Jeopardy! The IBM challenge. The Watson in 2011 competed against the former winners Ken and Brad. David Ferrucci, the manager of the Watson project at IBM research, said that several things probably confused Watson.

Brad took the first choice and selected the question 4-letter word for a vantage point or a belief and he answered as VIEW and won $200. Upto double Jeopardy, Watson was in lead with $5000.In the final Jeopardy, the category was "U.S. Cities" and the clue was: "Its largest airport is named for a World War II hero; its second largest for a World War II battle." and the answer was TORONTO given by Ken, but they confused with Chicago but finally Toronto was confirmed by Watson. In the final round the category: “Actors who direct” and Ken was answering instantly in a second. Another category was 19th century novelists and the clue was Wiliam wilkinson’s “an account of the principalities of Wallachia and Moldavia” inspired this author’s most famous novel. Finally Watson stood as winner and every person in that group filled with happiness. Brad, who was the biggest money winner on Jeopardy surprised on the technology of the Watson.

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 – [**<https://www.youtube.com/watch?v=CqSDWoAhvLU>**]**

Really exciting to see the progress we have-A self-driving car. What does it mean the self-driving vehicle? There is no steering wheel in the way. The following exciting benefits are there for a self-driving car.

Actually rides better than our own car.

If I have a self-driving car I can spend my time in a better way like feeding my children or guiding them in their homework or any other useful work.

There is a chance of less number of accidents.

It is very cute.

It is an opportunity to see around the car when we are in car in spite of driving the car.

This is very helpful those who cannot drive either because of ill health or engaged any other busy work or in a love with a girlfriend.

It is very impressive I am totally in love with this concept. It was a big decision really a kind of space age.

Self-driving car is faster than normal human driving car. It is self-controlled so there is no stress on human beings. It increases the productivity of labour and reduces the manual labour and so helpful in human welfare. Its speed is also self-limiting.

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.

**Babies help unlock the origins of morality – [**<http://www.cbsnews.com/news/babies-help-unlock-the-origins-of-morality/>**]**

The important step in understanding the secrets of morality is to understand the inborn feelings of the baby. Many people dislike immoral behavior like selfishness etc. To understand the origin of this morality one should understand the inborn feelings of the baby. Whether baby likes selfish people or selfless people and whether babies differentiate between good and bad. Or else if babies by birth moral or immoral and judge to punish the bad people.

Babies between the age group of 3 to 6 months cannot speak, write and cannot express their view on people surrounding them. They even cannot express like a parrot, pigeon or a rat. But they can express dislikes and likes by turning their eyes or head. They see less time (5seconds) for which they dislike and see much time (33 seconds) which they like. This is proved in Yale’s baby lab. They like helping individuals, condemning the others who are anti-social. Wynn and her team first published their findings about babies’ morality in the journal “Nature” in 2007. They find a very elemental level that babies are born with an innate sense of justice. The seeds of our understanding of justice, our understanding of right and wrong, are part of our biological nature. This is the way the babies help to unlock the origins of morality.

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

**CLARITY OPENS WINDOW TO BRAIN CIRCUITRY, new era for neuroscience – [**<https://www.youtube.com/watch?v=Z2yQJ1cexO4>**]**

Creatinga new brain imaging techniques is one of today’s greatest engineering challenges. Electrical Impulses from one part to the other is transmitted by neurons. The connections between the neurons in the brain are involved in everything we do, and no one’sconnection pattern is the same.

CLARITY has developed a new imaging technology that essentially makes the brain transparent. They took the brain tissue of different dead animals and dissolved the opaque, milky layer and opens window to brain circuitry, a new era of neuroscience. They inserted a transparent hydrogel in place of the tissue and made easy to look up the arrangement of neurons. This keeps brain intact and provides the brain’s neural structure. There are three different colours like green, red and blue which are the labels for different kinds of cells. They can generate detailed 3D structure that specify neuronal networks and helps to fix the problem. For example in the people suffering from depression the up and down connection of neurons can also be identified by this technology. It also helps in studying the electrical pathways of heart and fibres in the spinal cord which are damaged and cause pain. With this medical advancement and support of National Science Foundation (NSF) they hailed a new way of whole brain imaging.

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: 1.Universal Instantiation

2. Universal Generalization

3. Existential Instantiation

4. 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**

Answer Set Programming is one form of declarative programming which is based on stable model semantics of logic programming which includes ideas of both auto epistemic logic and default logic. System Lparse is created for frontend functioning of answer set solver Smodels, which uses traditional prolog styles. Prolog styles has unique stable model and this model consist of all queries to which it say ‘YES’. Let us consider Clique in the graph, the atoms will represent vertices in clique. If no stable mode exist then graph indicates that no clique of required size are present .In program C the first step (generate) is to find potential solutions and further steps (test) will eliminate bad solution .If we consider atoms for representing incomplete solution, then atoms which are present are said to be true and which are not are said to be false. This idea can be differentiate using negation which leads to two type of negation weaker rule strong negation and negation as failure. Frame problem which are closure to real time problems uses laws of inertia. As ASP has wide scope in real time this is presently using in Automated product configuration, Decision support for space shuttle, Inferring phylogenetic trees.

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.