Term Paper

on

Customer Support Through Machine Learning

submitted in partial fulfillment of the requirements

for the award of the degree

of

Bachelor of Technology

in

Computer Science and Engineering

By

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Under the guidance of

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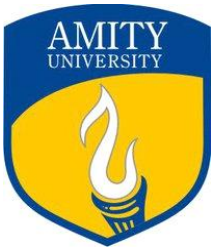

Department of Computer Science and Engineering
Amity School of Engineering & Technology
Amity University Madhya Pradesh, Gwalior
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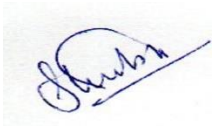
DECLARATION

I, **Shubhkant Dwivedi**, student of Bachelor of Technology in Computer Science and Engineering hereby declare that the Term Paper entitled **"Customer Support Through Machine Learning"** which is submitted by me to Department of Computer Science and Engineering, Amity School of Engineering & Technology, Amity University Madhya Pradesh, in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering, has not been previously formed the basis for the award of any degree, diploma or other similar title or recognition.



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This is to certify that **Shubhkant Dwivedi (Enrollment N0. A60205219017),** student of B.Tech(CSE) III semester, Department of Computer Science and Engineering, ASET, Amity University Madhya Pradesh, has written his Term Paper entitled **"CUSTOMER SUPPORT THROUGH MACHINE LEARNING"** under my guidance and supervision.

The work was satisfactory. He has shown complete dedication and devotion to the given work.

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ABSTRACT

With The Use Of Artificial Intelligence In The Current Scenario And In Future It Is Sure That There Will A Great Impact On The Marketing Strategies And The Behaviours Of Customers. With The Knowledge of A.I. A Multidimensional Framework Will Be Introduced Which Will Help To Understand About The Impact Of A.I. In Various Intelligence Level And Whether The A.I. Robots Are Better For The Enhancement Of Customer Experience.

Machine Learning Is One Of A Major Term Which Is Having A Great Importance Today Due To Its Capability Which Is Used By Computers In Which They Use Past Experience To Make Expert Predictions. Due To This the Computers Are Very Well At Their Work.

Customer Satisfaction Is One Of The Major Thing Which Organisation Tries To Be The Best At It.in This Modern World With Such Online As Well As Offline Service Machine Learning Is Used For Customer Service Where Basically A Customer Experience Management Software Tries To Know About Customer Experience And Try Out Some Good Tecchniques To Improve Their Customer's Experience.

This Text Will Provide You All Information That How Customer Services And Experience Are Enhanced Using The Various Techniques Of Artificial Intelligence Machine Learning.

Keywords:- Artificial Intelligence, Machine Learning ,Neural networks, Chatbot, Virtual assistant, Natural Language Processing, Supervised Learning, Unsupervised Learning, Deep Learning,Etc.

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Chapter 1

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Figure 1.1: A.I.

The Area Of Ai Science Was Born At A Workshop In 1956 At Dartmouth College, Where John McCarthy Coined The Word "Artificial Intelligence". Artificial Intelligence, One Of A Major Term In The Current Time Which Is Having A Great Impact And A Very Huge Scope In Future Because Of It's Different Applications.

The First Thing We Should Know That What Is The Definition Of Artificial Intelligence, So When The Machines Try To Intimate Human Senses By Acquiring The Capability To Understand And Solve Problems And Using Its Knowledge Acquired From Experiences.

A.I. Was Needed As It Can Be Used To Make The Systems Expert Who Can Work, Respond And Perform Task Using Their Experiences That Means That These Systems Can Also Be Used In Place Of Humans And Can Also Help Machines To Solve The Big And Complex Problems By Applying Some Algorithms And Finding It's Approximate Solutions.

The System Which Has These Special Powers To Work Like Humans Are The A.I. Systems Which Consist Of An Agent And A Particular Environment. For An A.I. System An Agent Is Something That Can Perceive The Environment Through Sensors And Acts Upon The Environment Through Effectors. Intelligent Agents Are Made In Such A Way That They Must Be Able To Set and Fulfill Targets.

Real World Applications of Artificial Intelligence Are: -

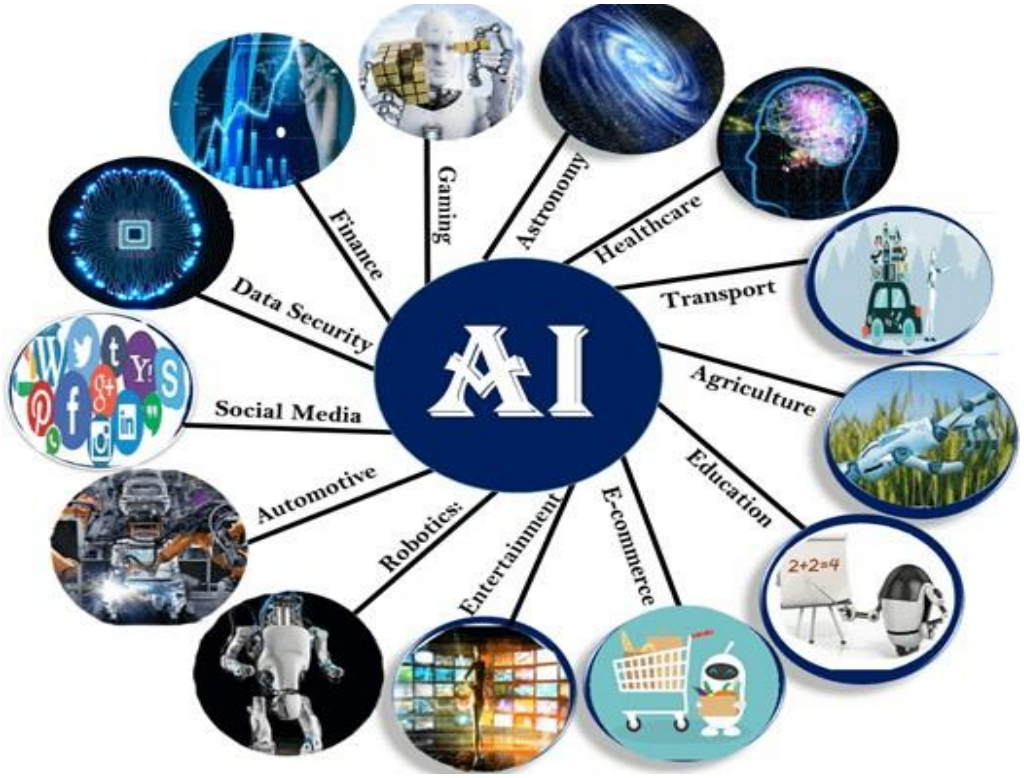

Figure 1.2: Applications of A.I.

Advantages and Disadvantages of A.I.

Advantages

- Reduction In Error From Human
- Accessible 24x7
- Online Assistance
- Proper Implementations
- Quick Judgments

Disadvantages

- High Costs Of Development
- Make Humans Lazy
- Unemployment And Poverty
- No Emotions
- Lacking Out Of Box Thinking

Chapter 2

MACHINE LEARNING, A FUNDAMENTAL CONCEPT OF AI

Figure 2.1 M.L.

Arthur Samuel, A Pioneer In Computer Science And Artificial Intelligence, Came Up With The Term Machine Learning In 1959.so, The Next Topic In This Chapter We Are Going To Discuss Is Machine Learning Which Is One Of A Subsets Of A.I. And Has A Lot Of Algorithms And Applications For The Welfare Of People As Well As For The Upliftment Of Technical Society.

Now Let's Go And Check Out The Definition Of Machine Learning Which Can Be Understood As Massive Volumes Of Data Are Fed Into A Computer System, Which Machine Uses To Learn That How To Conduct A Given Task. Machine Learning (ML) Is The Study Of Computational Algorithms That Automatically Evolve Over Experience. It Is Used As A Branch Of Artificial Intelligence. For Making Predictions, Ml Algorithms Build Up A Mathematical Model Based On Specimen Data, Defined As "Training Data."

Machine Learning A Subset Of Artificial Intelligence Was Required As It Can Be Used To Bring The Expertise Machines Which Can Work, Respond And Perform Task Using Their Past And Current Experiences.

Now We Are Going To See The Different Ways Of Machine Learning

Through Which A Machine Learns: -

- Supervised Learning: It Is A Machine Learning Technique In Which A Machine Learns A Feature That Maps An Input To An Output Based On Pairs Of Input-output Instances. It Infers A Feature Consisting Of A Series Of Training Examples From Named Training Data.

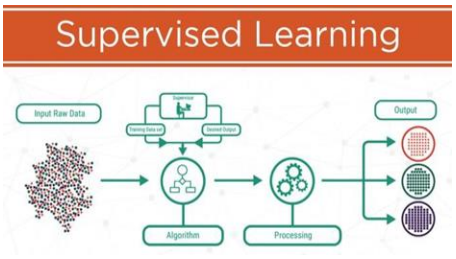

Figure 2.2 Supervised Learning

- Unsupervised Learning: - Unsupervised Learning Is A Method Of Machine Learning In Which The Model Does Not Need To Be Supervised By Users. Instead, It Enables The Model To Operate On Its Own To Uncover Trends And Previously Undetected Knowledge. In Contrast To Supervised Learning, It Deals Mostly With Unidentifiable Data. Allow Users To Perform More Complicated Computing Activities.

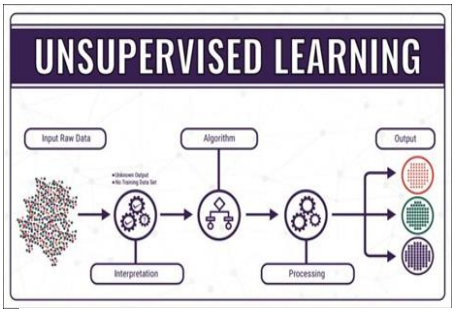

Figure 2.3 Unsupervised Learning

- Reinforcement Learning: - The Teaching Of Machine Learning Models To Make A Series Of Decisions Is Reinforcement Learning. In An Unpredictable, Possibly Complex Environment, The Agent Learns To Attain A Target. Just Like Unsupervised Learning And Supervised Learning, Reinforcement Learning Is One Of A Major Part Of Machine Learning Techniques..

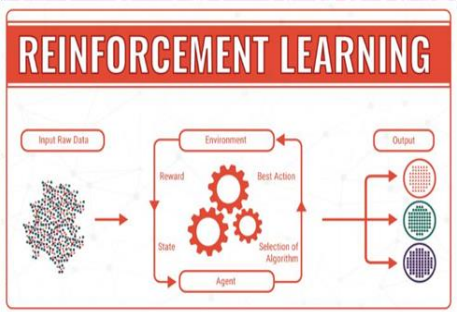

Figure 2.4 Reinforcement Learning

Real World Applications of Machine Learning Are: -

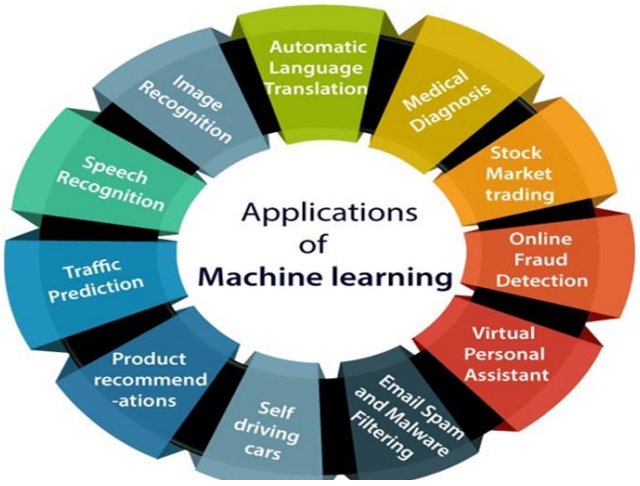

Figure 2.5 Machine Learning Applications

Advantages and Disadvantages of M.L.

Advantages: -

- Easily Detect Patterns And Themes
- No Human Mind Required
- On-going Enhancement
- Multi-Dimensional and Multi-Variety Information Handling Wide Applications

Disadvantages: -

- Acquiring Info
- Money and Time
- Results Explanation
- Elevated Error- Susceptibility

Chapter 3

ENHANCING CUSTOMER EXPERIENCE, CHATBOTS A MAJOR TERM

Figure 3.1: Chatbot

The Term Chabot's Was Introduced In The Year 2016.now We Shall Go Across And Check That How Can We Define Exactly That What A Chatbot Is So The Answer To The Question Is That Chabot's Are The Computer Programs Which Can Help Customers For Their Problems And They Can Communicate To Them Through Messaging. Some Major Examples of Chabot's Are: -

- Medwhat Chatbot: - A Chatbot For Medical Diagnoses That Helps Both The Doctors And Patients For Faster Medical Diagnoses.

Figure 3.2: Med what Chatbot

- Roof Ai: - A Chatbot That Allows Real-estate Marketers To Automate Contact Through Social Media With Potential Leads And Lead Assignments

Figure 3.3: Roof A.I. Chatbot

- Alice: - One Of The Very First Online Bot That Introduced A Lot Of Chatbots To This Digital World Etc., And Many More.

Figure 3.4 Alice Chatbot

Chabot's Are There In The World From A Very Past Time Because For The First Chatbot That We See In The 1960's, With Professor Joseph Weizenbaum Was Called Eliza Which Was First N.L.P. Chatbot That Showed That Conversation Between Human And Machine Is So Interesting. Eliza Used Patterns To Understand Language And Then Reply To The Conversation. But With The Modern Times And Implementation Of A New Era Many New Chabot's Arrived That Have The Capability To Understand And Solve People Questions Faster.so Why Chabot's Are Very Useful Today Because Chabot's Uses Messaging or Audio Messaging, In This Current Modern Time We See That Messaging And Voice Messaging Are Of Great Use And The Second Major Thing Is The Advance Researches In A.I. With The Implementations of M.L. and D.L. That Helps Such Machines and Chabot's to understand and Work on the Problem Easily. Some Major Parts of a Chatbot Where It Should Be Well at Its Work to Perform Well in Today's Time

- The Interface That the Chatbot Is Providing For The Customer Satisfaction.
- The Intelligence, Which Is Present Behind The Chatbot Working, As A Chatbot Is Good At Its Work Only When It Is Able To Perform Its Task Without Any Kind Of Problem, So Intelligence Plays A Major Role This Side.
- The Last Thing Is Integration Which Tells That How Chatbot Tries To Manage With Other Platforms So That It Can Access More Data And Can Trasmit Human's Particular Problems To Human Agents.

Chabot's Are Playing A Huge Role In Today' S Time And The Major Reason Is That Because It Is Providing Good Results As Chabot's Are Able To Solve Much Problems Of Human On Its Own Like We Say Around 80% But There Are Some Problems That Cannot Be Solved By Chabot's But Combining Chabot's Intelligence And Human Agents Can Solve Around 90% Of Humans Problem Which Can Be Seen As One Of A Great Achievement. Second Reason Is About Convenience Which Can Be Saw As Human Don't Need To Download Any Kind Of Apps Or To Do Any Kind Of Calls For Their Problems, by Simply

Texting With Chatbot A Person Can Solve Its Problem. Third Major Reason Is That How Chabot's Are Going To Work In The Future Because Understanding The Demands Of Digital And Modern Generation Is Very Much Needed By Companies And Department To Provide Them With The Best They Have. With Short Surveys Through Chabot's Companies And Department Can Easily Checkout The Mindsets Of Their Customers.

In This Current World We See Chabot's Are A Major Part Of Digital World With Around 29000 Approx. Chabot's In Facebook, Around 9 Million Approx. Chabot's In We chat And With Companies Like Apple,Google,Samsung,Microsoft,Amazon, Facebook And Many More Investing A Lot Of Money To Generate Their Own Digital Chabot's And Assistants So That They Can Provide More And More Facilities To Their Customers .likewise The Introduction Of Chabot's In Medical, transport And Various Facilities We See That The Chabot's Are Very Much Needed As They Are Working A Lot To Work According To Their Needs And To Provide Them With The Best Result They Can As This Can Help To Maintain The Respect Of The Company Or Department.

Advantages and Disadvantages of Chabot's

Advantages

- Provides Faster Customer Service as Chabot's Work Faster in an Area Where Solutions to Problems Are Well Predicted.
- Customers Satisfaction Is Increased As Users Can Ask Questions Through Chat Or Chatbot Can Use N.L.P To Understand Human Language.
- As Chabot's Can Easily Solve Common Problems So Human Agents Can Work Out With More Complex Problems And With Use Of Chatbot Labour Cost Can Also Be Reduced.
- Whenever A Complaint Is Registered By A User Regarding Any Facility By The Organisation Then The Customer Wants A Human Agent To Solve Rather Than Some Digital Application But Making Chabot's To Work With N.L.P. Can Make Them To Register And Pass Complaints To Desired Human Agents.

Disadvantages

- On The Contrast Chabot's can Solve Around 95% Problems but the Figure Never Matches 100% Without a Human So This Is a Con.
- On The Contrast If a Customer Doesn't Know How to Work with Chatbot Him/her Will Revolve around His Problem and Can Get Frustrated.
- On The Contrast Maintenance And Development Of Chatbot Can Cost A Huge Price And Is Not Possible For Every Organization And Department To Get It.
- Chabot's Work On Internet Connectivity's And On Severs But Whenever A Server Or Connection Fails Than The Chabot's Are Of No Use So This Might Be A Small Problem With Chabot's Or Any Other Digital Application Because In This Case Customers Prefer Human Agents.

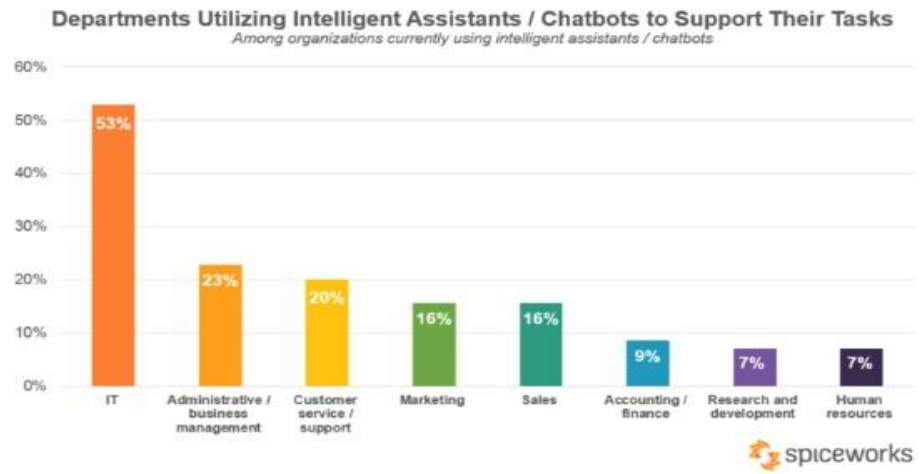

Figure 3.5: Graphical Usage of Chatbot

Now We Have Seen That Chabot's are Very Well at Their Work but a Major Question Arise That Weather Chabot's Will Lose the Control of Customer Experience?

So, For The Upcoming Time In This Modern World I Don't Think Chabot's Will Go Down But For Making Them Well As For Future Some Approaches Are Required: -

- Proper Timely Checks Should Be Performed So That The Service Flow And The Result Formation Should Be Checked And Proper Adjustments Should Be Done Accordingly

- Chabot’s must Be Stopped in Cases Where There Are a Huge Chances of the Customers to Get Frustrated.
- A Systematic Approach Must Be There So That Human Agent Must Be Aware About The Chatbot Works And That Human Agent Must Have The Right That When The Chatbot Is Causing A Problem Then The Human Agent Can Interfere And Can Make Customers Satisfied.
- A Proper Team Should Be Made So That The Chatbot Should Be Well At Its Intelligence And Must Be Good At Its Interface So That The Customers Must Always Feel Good To Work With It.

With All These Solutions For The Chabot’s For Future And With The Upcoming Modern Times With A Digital Environment And With Huge Applications Of M.L. and A.I. ,We See A Very Vast And Useful Future Of Chabot’s.

CHAPTER 4

IMPROVING CUSTOMER EXPERIENCE, INTRODUCTION TO VIRTUAL ASSISTANT

Figure 4.1: Virtual Assistants

So, Virtual Assistants Are One Of A Major Term In The Field Of Machine Learning And Artificial Intelligence In This Digital World. With Implementation of These Customers Are Getting a Lot of Benefits.

So, The First Voice Activated Toy, radio Rex Introduced During 1911 Was A Dog Who Came Out From His House Whenever His Name Was Called. Virtual Assistants Are The Kind Of Assistants Who Are Ready To Help Customers Whenever They Are Called By The Customers By Calling Out Them.

Now A Major Question Arise In The Mind Of All That How We Define What Actually Are Virtual Assistants, So They Are Defined As They Are The Digital Agents That Can Find Solutions To Problems On The Basis Of Different Commands And Questions Generated By A Particular Customer. There Usage Is Rapidly Increasing As A Lot Of New Technologies And Products Are Involving.

Some Major Examples Of Virtual Assistants That We Commonly Know Are:-

- Google Assistant: -virtual Assistant Made Up By Google That Uses Your Voice Stored On The Cloud To Make The Assistant More Valuable, You Can Call Up It By Saying “ok Google”

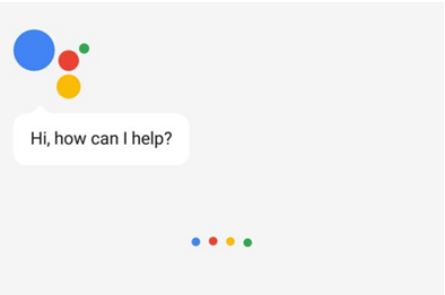

Figure 4.2: Google Assistant

- Amazon Alexa: - Virtual Assistant Made Up By Amazon That Uses Your Voice By Saving One Of Its Recordings On The Cloud, You Can Call Up It By Saying Out Its Name “alexa”

Figure 4.3: Amazon Alexa

- Apple’s Siri: - Virtual Assistant Made Up By Apple Which Is More Secure As It Not Saves Your Voice upon The Cloud, But Instead Of Voice It Uses Transcripts Which Can Be More Secure And Valuable, you Can Call Up It By Saying Out “hey Siri”.

Figure 4.4: Apple Siri

Etc. And Many More Are Present for Customer’s Happy Experience.

Most of the Points above Said Makes a View That Chabot’s And Virtual Assistants Are Probably Same. So It Might Be Considered That Both Of Them Are Same As They Both Are Working On The Same Digital Platforms And They Both Are Using A.I. And M.L. Applications For The Best Experience Of Customers But There Are Some Sort Of Differences Between These Chabot’s And Virtual Assistants. The Innovation and Mind Skills Behind Virtual Assistants Allows Them to Use in a Wider Area. Somewhat Some Functioning A.I. And M.L. Algorithms In The Past Time Has Lacked Virtual Assistant But Instead They Have Some Unexpected Skills, May Also Be Capable Of Activities Such As Conducting Analysis And Comparing Items But On The Contrast Chatbot Are In A Way That They Can Work Up To A Limited Purpose In Contrast To Virtual Assistant. Universal Chabot’s Would Not Make Sense Until The Hardware Became So Inexpensive That The Ordinary Company Owner Could Afford An All- Encompassing Company Bot.

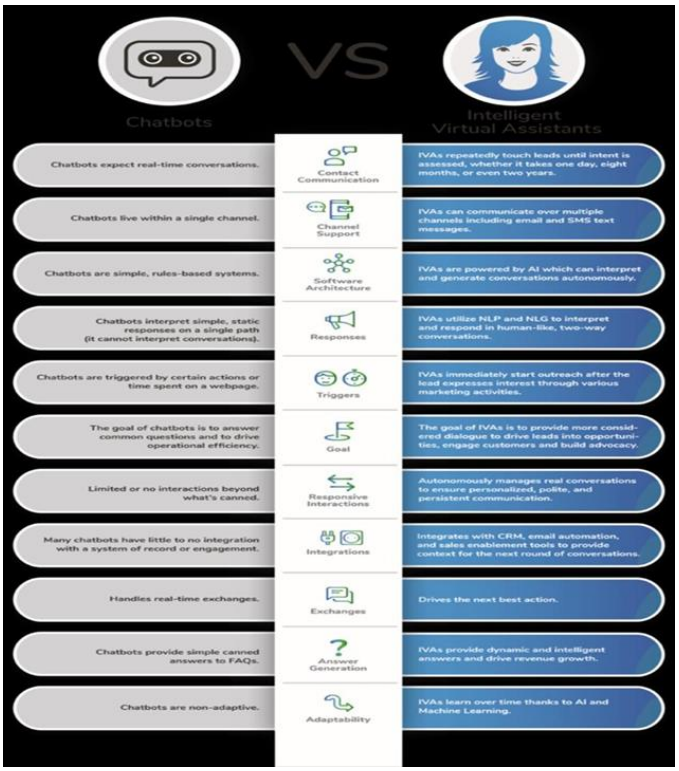

Figure 4.5: Chatbot v/s Virtual Assistant

Chapter 5

ROLE OF MACHINE LEARNING IN ENHANCING CUSTOMER EXPERIENCE

Figure 5.1: Role of Machines

Machine Learning Is Playing A Very Huge Role In This Digital World With Lot Of Its Applications Working For The Welfare Of Humans. Now The Enrollment Of Machine Learning In Customer Experience Is The Major Topic We Are Going To See In This Chapter.

User Support Specialists Play A Vital Role In Constantly Enhancement Of Customer Service In Assisting And Troubleshooting Application And System Problems. Machine Learning Applications Have The Power To Solve These Customer Care Difficulties.it Can Start Up With A Method In Which The Problems Are Firstly Identified With The Enrollment Of A Agent Or Not And Hence With This Machine Learning Method Customer Experience Can Be Improvised And The Money Used Can Also Be Reduced. Machine Learning Plays A Significant Role In Solving Customer Service Problems, Through These Technologies An Specialist Can Continually Develop On The Basis Of Historical And Current Troubleshooting Evidence. Whenever A Customer Calls Up A Machine Agent For Its Problem Then The Machine Agent Tries To Collect Some Basic Parts Of The Problem And Then The Machine Starts Processing It And Then The

Machine Uses Its Troubleshooting Guide Which Has Log Data Which Can Be Used By The Machine To Solve Up The Customer Query By Providing Him Some Sort Of Solution.so, The Machine Basically Tries Up To Get The Troubleshooting Data Which Is In Form Of Some Question And Answer Pattern. Her Are Different Troubleshooting Flow for Each Kinds of Questions or Problems and These Data Is Inserted Into The Machine. The Troubleshooting Data Fed Up In The Machines Are At A Very High Level.

So, How A Machine Agent Works When A Customer Comes To It???

The Answer Is That It Works In Form Of A Cycle Where It First Tries To Receive The Problem Faced Up By The Customer Then It Tries Up To Diagnose It And Then It Find Patterns In His Troubleshooting Guide Regarding The Problem To Find The Solution Flow To The Customer.

Figure 5.2: Machine Working Cycle

Now We Are Going To See That How We Can Apply Machine Learning To Support The Customer Needs, by The Use Of Pattern Recognition And Computational Learning Machine Learning Has The Power With Which It Can Implement Algorithms And That Will Help Them To Learn And With That They Can Useful Predictions On The Data. With The Use Of Machine Learning Companies And Organisation Now Have The Capability With Which They Can Analyse A Big Bundles Of Data. The Main Focus And Dream Of Machine Learning Is To Make A System Expert Which Can Easily Get To

Know About The Troubleshooting Log And They Must Have A Good Capacity With Which They Can Easily And Quickly Solve Customers Problem.

The Machine Learning Applications Are Focusing A Lot On The Enhancement And Upliftment Of Machines And With All This I Personally Think That Without Machine Learning And Artificial Intelligence There Is No Future Of Machine And Without This Digital World And Applications There Will Be No Enhancement Facilities For Humans.

Chapter 6

SHORT CASE STUDY ON ASIMOV'S FOUNDATION

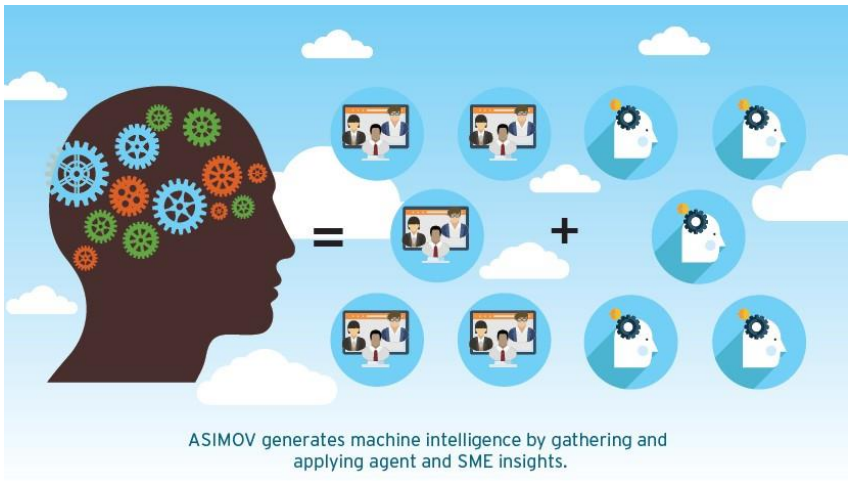

Figure 6.1: Asimov

So, This Is A New Term That I Am Using In This Paper Which Might You All Have Not Heard Or Studied About. So Here I Have Only Picked Up This Topic To Make You All Aware About The Term Asimov And After Reading This Complete Chapter You All Will We Aware About It.

Asimov Is Basically An Idea Based On M.L. Introduced By Cognizant's Global Technology Office High Performance Computing Labs(H.P.C. Labs).When Basically I Was Studying About The Topic And When I Came To Know About Asimov And It Is Developed By Cognizant Then I Want To Take A Short Part Of It In My Paper.

Figure 6.2: Cognizant

It Generally Have Some In Built Software And Some Works That Can Help To Solve Troubleshooting Task.

So, Let's Check Out How These Software Programs Works:-

- Firstly, They Take Out The Troubleshooting Data And Try To Compare The Data With The Difficulty So They Can Find The Particular Solution For It.

- They Generally Take Out A Huge Amount Of Old Troubleshooting Log And The Machine Learning Developed Model Tries To Predict The Problems And Starts Recommending Particular Answers.

- Algorithms Are More Emphasized From The Beginning When The Particular Data Is Inserted And Till The Last When The Desired Data Is Extracted

- Recommending Engine Is Always Present So That Faster Solutions Can Be Provided By The Machines.

- They Have The Powers To Resolve The Queries Of Customers With Good Quality Decisions Implemented Through Machine Learning.

Figure 6.3: Support by Asimov

Figure 6.4: Asimov Working Platform

Chapter 7

CONCLUSION

The Conclusion For My Overall Paper Is That Without The Role Of Artificial Intelligence And Machine Learning There Is No Scope Of Machine's Future, The Future Where Machine Will Replace Humans. But As We See That the Upliftment Of Digital Society In The Present World There Is A Lot Of Applications And Experiments Related To A.I. And M.L. Coming Up In Future. With These All Decent Applications like N.L.P., Speech Recognition, Text Recognition, image Processing And Many More, Machines Are Made Up Of Very Use In Today's Time. Customer Support And Customer Experience Will Also Be Enhanced With These Upcoming Facilities In The Modern Time But Since As We All Know That Everything Which Has An Advantages Will Also Have Some Sort Of Disadvantages So The Applications That Are Good Today Might Have Some Kind Of Problems Tomorrow, the Main Reason Is That The Digital Thing Should Be Checked Time To Time And It Must Be Ensured That New Technology Must Be Applied And Experienced On It. As Of Now I See As A Better Future For Humans Where Machines Will Definitely Try To Come And Stand Up Like Human Work.

Chapter 8

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