# Artificial Intelligence Doll: Hello Barbie

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Abstract— Modern dolls that can "speak", play an important role in shaping the young minds of children. Artificial intelligence is the future of technology that has ease the "humanizing" of objects. . The desire to make inherit objects more user-friendly and functional has facilitated the research and development of AI. Toys are a major component in each and every child's life and the necessity to develop toys that encourage communication is a common trend today. .

Index Terms— Psychological effects, Internet of Things, Voice Search, Machine learning

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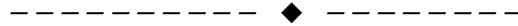
1 INTRODUCTION

In [1] A recent U.S. Recent census report shows 7 million of the nation's 38 million children ages 5 to 14 are left home alone regularly. Now-a-days for many parents, this is not a happy chosen decision. The increase in single-parent households, the need for both parents to work in two-parent families, the lack of availability of affordable and constructive childcare, and the fact that school days are out of sync with workdays all create an untenable situation. For many families, there are gaps in child supervision that seem impossible to fill. Outfitted with the latest advancements in AI-enabled toys implies that the child shall have a chance to express their feelings, ask a question. As such, the information recorded on the toys is used to generate a series of algorithmic based response, which is related to the history of the information thereof.

2 EXISTING RESEARCH AND DEVELOPMENT

As we have discussed above, about the problem of psychological impact, Logistic regression demonstrated associations between parental psychological distress and increased likelihood of child mental health problems, there are many research have been progressively done in these fields.

3 PSYCHOLOGICAL IMPACT

What are the psychological impact on the children who are left alone in home? A recent U.S. Recent census report shows that 8 million of the country's 40 million children ages vary from 4-12 are left alone at home regularly. For many working parents, this is dysphoric or freely chosen conclusion. Many children who are left alone at home are frightened. They may feel anxiety when they hear ordinary sound in an empty house. They may be scared of burglar alarm. They may be even more afraid of the strong children on the block. Television, music and video games have taught our children that there are enormous amount of things to be afraid of in the universe. When the children are asked about why don't you inform your parents about your fear, the children replies that they don't want their

parents to get worried about them.

In [2] 2018 , Doi S, et al. ,has made a statement, that the author speaks about the impact of leaving children aged 6 or 7 years at home alone on their mental health .Leaving children at home alone is considered a form of "neglect" in most developed countries. In Japan, this practice is not banned, probably because this nation is considered to have relatively safe communities for children. The caretaker of all the children in the 1st grade in Adachi City, Tokyo, were targeted, of whom 80% completed the questionnaire (n = 4,291).Among the logical illustrative which comprises of both exposure variables and resultant variables (n = 4,195), 2,191 (52.2%) children had never been left at home alone, 1,582 (37.7%) children were left at home alone less than once a week, and 425 (10.1%) children were left at home alone once a week or more.

In [3] 2018 , Kizuki M, et al., has made a statement, that child mental well-being and good health is known to be influenced by parental work hours. Although literature proposes that parent-child relation mediates the association, few studies have directly studied the parental time of returning home from work. We have analyzed the data from a school-based survey to glance at the association between parental time of returning home from work and child mental health. We have studied the correlation between announced parental time of returning home and the continuous Strengths and Difficulties Questionnaire (SDQ) scores using multi variable regression modeling. Results: Children whose parents returned home late (later than 6 p.m. for the mother and later than 8 p.m. for the father), or at irregular times, had higher scores in total difficulties ($ß = 1.20$, 95% CI: 0.56 to 1.86), the "conduct problems" subscale ($ß = 0.37$, 96% CI: 0.13 to 0.60), and the hyperactivity/inattention subscale ($ß = 0.53$, 96% CI: 0.24 to 0.82) compared with children whose

parents both returned home earlier. Mediation analyses indicated that the percentage of the sum of association between parental time of returning home and the SDQ(Strengths and Difficulties Questionnaire) scores, which was mediated by parent-child interaction, was 20% (95% CI: 10 to 46) for total difficulties, 17% (95% CI: 7 to 49) for conduct problems, and 23% (96% CI: 12 to 53) for hyperactivity/inattention. Conclusions: Late or irregular returning home time for both parents had an adverse effect on child mental health, and the relationship was partly mediated by reduced frequency of parent-child interaction.

In [4] 2014, Amrock SM1, et al., has made a statement, that Logistic regression signifies associations between parental psychological distress and increased likelihood of child mental health problems. Children aged 4 to 11 were more likely to have mental health problems if they had a psychologically distressed father (odds ratio [OR] 7.6, 95% confidence interval [CI] 2.5-24.4) or mother (OR 6.9, 95% CI 2.8-16.7). Children aged 12 to 17 with a psychologically distressed male parent (OR 4.54, 95% CI 1.18-17.48) or female parent (OR 3.91, 95% CI 1.36-11.38) were also more likely than those without to have mental health problems. The parents both father and mother, relationship that exists between the parental psychological distress, and abnormal emotional manifestation in younger children, conduct untidiness in older children, and hyperactivity in children of all ages.

In [5] 2009, Karin Dahlberg has made a statement that the phenomenon of loneliness stands out in synonym as "figure" against a "background" of fellowship with "important" people. In order to understand loneliness and its synonym, we must first consider this "background of fellowship" and its relation to loneliness. The paper addresses the question: What is loneliness, what is its essence? One is lonely when importance of others are not there or when none is giving priority, because either one has rejected them or they have chosen to be rejected and left the person behind, feeling lonely. One can reject others in favor of another kind of connectedness. Such loneliness is restful and pleasant. Loneliness is a phenomenon that belongs to life, to existence, and is something we all recognize; everyone has felt loneliness at some point of time. The experiences, however, are very varied, and loneliness can be described in many ways. Even to one person, loneliness can be experienced differently at different times and in different circumstances.

In [6] 2018, Marie Hartwell-Walker says that Many parents feel guilty about their children being left alone in home when both of the parents are working. Their own tension and anxiety increases from the time they know that school has let out until they can get home. Distracted by worry, they find that their productivity goes down and their clock-watching goes up until they can walk in their own home doors. Other parents minimize the issue by finding other ways. Unable to deal with the worry and unable to change the situation, they put themselves in a state of functional denial, convincing themselves that of course everything is all right, that the kids are more mature than they really are. Still other parents take cares by cell phone by asking their children how are they doing at home. Their kids are instructed to call when they leave school, when they get home, after their snack, while they do their homework, and whenever they have a problem or issue. It keeps the parents in touch, they can come to know what exactly their children are doing but it means the parent isn't working effectively and the child is tethered to the phone.

Barbie said. "I just know we're going to be great friends." Their exchange was the fulfilment of an ancient dream: Since there have been toys, we have wanted them to speak to us. Toy inventors in the mid-1800s, deploying roar in place of human lungs and reeds to simulate vocal cords, managed to get dolls that has the ability to say short words like "pappa". Thomas Edison's first idea for commercializing his new phonograph invention was "to make the Dolls speak, sing and cry", as he wrote in a notebook entry in 1877. In the 20th century, doll manufacturers gained with the products like Dolly Rekord, which can utter nursery rhymes and small poems in the 1920's; Chatty Cathy, in 1959 released from Mattel whose 11 expression included "I love you"; and Teddy Ruxpin, a mid-1980's stuffed bear whose mouth and eyes moved as he was telling stories

4 INTERNET OF THINGS (IOT)

Why IOT?

The Internet of Things is the network of devices that are connected together and are used to communicate with each other to perform particular tasks, without requiring human interaction. It is the system that interrelates mechanical devices and other computing devices .It is about installing sensors such as GSM and GPS module, RFID tags, IR, voice sensor for different platforms and finally connecting them to the internet for information

exchange, in order to achieve detecting, intelligent recognition, location, tracking, monitoring, management. With the help of technical support from IOT, a smart city needs to be insubstantial, coordinated, and intelligent.

Different application areas where the IOT works:

- Smart homes
- Connected cars
- Wearables
- Industrial Internet
- Smart cities
- IOT in agriculture
- Smart retail
- Energy engagement
- IOT in healthcare
- IOT in poultry and farming
- IOT in Smart Building [6]

Internet of Things (IOT) consider the idea of remotely connecting devices and monitoring real world objects through Internet. When it comes to our house, this concept can be capably incorporated to make it smarter, safer and automated. This project mainly focus on building a smart wireless home security system which sends alert to the house owner by using Internet in case of any intrude and elevate an alarm optionally.

Besides [7], the same can also be employed for home automation [6] by making use of objects, modules and set of sensors. The contact obtained by tendering this system over the same kind of existing systems is that the alert message and status of the module sent by the wifi enabled micro controller system can be received by the user on his mobile from any distance regardless of whether his mobile is connected to the internet or not. The micro controller (MC) that is been used in the current prototype is the TI-CC3200 Launchpad board, which comes along with an embedded micro-controller system and an onboard Wi-Fi shield which make use of all the electrical gadgets that is been used inside the home can be commanded and monitored.

IOT on Environmental Monitoring and Management [14, 15]

In 2014, Shifeng Fang, et al., made a statement that weather forecasting and environmental monitoring and management have received much observation recently, and an integrated information system is observed to be highly valuable. It provides the functions of organizing, processing, storage, and sharing of data and other information, including the different kinds of functions that are performed in applications regarding environmental monitoring and management. There is a visible raising trend of the air temperature in Xinjiang over the past 50 years i.e., (1962-2011) and an evident increasing trend of the precipitation took place since the early 1980s. Moreover, from the association between ecological gauge and weather forecasting elements such as air temperature and precipitation, water resource availability is the conclusive element with regard to the terrestrial ecosystem in the area. The study shows that the research work is greatly benefited from many sources such an IIS, not only in data collection that is supported by IOT, but also in Web services and other applications that is based on cloud computing system and e-Science platforms, and the success of monitoring processes and decision-making methods can be patently improved. This paper provides IIS for both climate change, environmental monitoring and management, and it also provides a new model for the future research and practice; especially in the period of big data and IOT.

In 2017, Paul Pickering made a statement that Barbie debuted for the Christmas season 2015. He stated Barbie as 'Internet of Toys Edge Node'. Now, through maintaining the relationship with San Francisco, the doll can carry on the conversation with WiFi Connectivity enabled device, where child can answer question suggest games and discuss the latest the latest trending news with the help of a cloud based server. Mattel's EZ-Connect Wifi Controller provide processing power .The Audio enabled device used in Barbie was Nuvoton NAU88U10, which is lower power monophonic audio coder-decoder. This Audio codec gains support in different fields of Barbie such as ALC (Automatic Level Controller), PGA (Programmable Game Amplifier), PPL (Phase Locked Loop). These features made toy rely on preprogrammed responses.

In 2017, Mickey made a statement that Cognitive Dino includes WiFi enabled link to IBM Watson cloud based platform, which does not rely on preprogrammed responses. It ditches purple color on favor of pink blue and green. Although many toys are bluetooth enabled, they made use of Wi-Fi connectivity, because it is ubiquitous. Microphone enabled device is defaultly muted in their doll when there is no conversation, and doll becomes activated when it presses "belly button". The another mechanism performed on doll based on IOT

market is Mesh Network, which communicates peer-to-peer without any controlling gateways. Many companies made use of this technology namely, Disney Research developed a similar kind of toy which is toy-toy-toy communication which extended WiFi Power Saving Mode (PSM) to accommodate Mesh fashion.

In 2015, David Linthicum made a statement that Hello Barbie, a network-enabled, cloud-powered, AI-driven doll that will hold a conversation with your kid. According to Tech Republic, it is stated that "Hello Barbie's necklace is both a recorder and a microphone. Using Wi-Fi and other components, the jewellery will receive up a child's queries and conversations and then transmit them back to a controlling center that is further used for processing. Voice or Speech-recognition software,that is operated via Toy Talk, will detect the input. Then, Hello Barbie will respond to the child, by using one of 8,000 pre-programmed lines that is already present".

5 VOICE SEARCH

What is Voice Search Technology?

Voice search is a voice recognition technology that allows a user to carry out a search through a voice instructions.
Although designed to be a software application, it can also be used by smartphones and other small Web-enabled devices.
Why Voice Search is needed?
The use of voice-control technology has become ordinary and is now growing worldwide. In the US, the ratio of people who make use voice assistants including Amazon Alexa, Apple's Siri, Google Assistant, Samsung's Bixby and Microsoft Cortana—is increasing faster than previously forecasted.

- 55 percent of juvenile and 41 percent of adults make use of voice search technology more than once a day. Either to call someone or need to find the directions people rely totally on their voice assistants to get instant help without any screens.

- This technology makes life more easier and comfortable because it allows internet users to focal point on multi task at the same time, thanks for the probability to talk instead of typing .This speeds up the process of seeking for information, as asking Siri or Alexa is faster than typing a query on your smartphone.

- In general, voice assistants are convenient, flexible, easier and cool to use.

- Among all other advantages, they also generate emotions. It may be just an application, but people bond

to their talking devices 41 percent of users say it feels like talking to a friend or another person. There's no hesitation that; voice search is here to stay and thrive, and statistics confirm it.

Facts:

By January 2018, there was an average of one billion voice searches took place every month, proving that voice search is on the rise. In 2019, an estimation was made that 111.8 million people in the US will use a voice assistant at least monthly, up 9.5% from last year. This is equivalent to 39.4% of internet users and 33.8% of the total population.
Voice search drastically exceed user experience – and because of that, by the year 2020, half of all online searches will be made via voice search.

Voice Search Statistics for 2019:

- eMarketer predicts that over a third of the US population (111.8 million people) will use a voice assistant monthly in 2019, up 9.5% from 2018.

- ComScore predicts that by the year 2020, 50% of all online searches will be performed with voice search.

- A Gartner study predicts that overall 30% of browsing sessions will include voice search by 2020.

- According to NRP and Edison Research, 1 in 6 Americans owned a smart speaker in 2018.

- Studies from Alpine.AI show that, as of January 2018, voice searches averaged 1 billion per month.

- 1 of every 4 American homes equipped with Wi-Fi owned a smart speaker in 2018, according to Nielsen.

- According to Google, 52% of smart speaker owners keep them in a common room such as a living room. 25% of these people keep them in their bedroom, while 22% keep a smart speaker assistant in their kitchen.

- A 2018 study from Bright Local found that 58% of consumers used voice search to find a local business in 2017, and 46% of people using voice search daily are searching for local business.

> ➢ According to an Adobe Analytics survey, the most common voice searches on smart speakers are asking for music (70%) and the weather forecast (64%), followed by fun questions (53%), online search (47.5%), news (46.2%), and asking directions (34%).

In [21] This technology underlying many spoken dialog systems (SDSs) that furnish users with the information they are requesting for with a spoken query. The information usually exists in a large set of database, and the query has to be compared with a field in the current database to obtain the relevant information. The contents of the field, such as business or product names, are often in a unstructured text which is convenient for the users to understand. For instance, Directory assistance (DA) [22] is one of the most popular voice search app, in which users provide a spoken query and an automated system return back the contact number and location information of a business or an individual. Other voice search applications include music/video management [23], business and product reviews [24], stock price quote, and conference information systems [25, 26].

In 2017, Kajal Purwar, et al., made a statement that, the wireless home automation system is an integrated system to help seniors and disabled persons with a simple to-utilize structure that can be entirely functioned created on voice commands.

In [8] 2008, 800-GOOG-411 is an automated system that uses speech recognition and web search to help people find and call businesses.

In [9] introduced our first multi-modal speech application [8] for Google Maps for Mobile (GMM).

In November 2008 we introduced Google Mobile App (GMA) for iPhone that included a search by voice feature [10]. GMA search by voice extended the paradigm of multi-modal voice search from searching for businesses on maps to searching the entire worldwide web. Speech recognition software converts the audio signal in to text file which would be analyzed. Voice search essentially allows children to speak to a Barbie as opposed to typing key words in to a search query to generate results.

Investigation into Google's voice search technology

According to Phil Geelhoed, the main goal is to give the user the right answer or perform the right action, based on his spoken query, in a appropriate time frame the challenge is, where only the 'appropriate' audio data needs to be filtered out of the audio data stream.
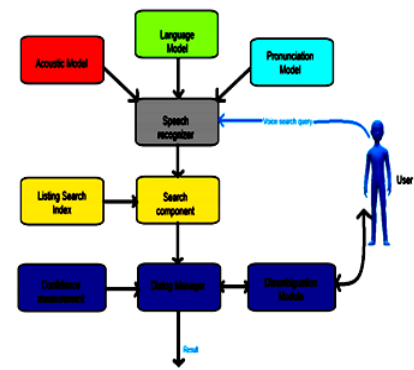

Figure 2.1: Basic architecture of voice search system with user interaction

6 MACHINE LEARNING

The machine learning enables computers to think, make a decision and take the action like humans has been one of the most important and interesting enlargement in the field of computer science technology. Several algorithms have been planned over time to make systems mimic the human brain and many programming languages have been used to develop those algorithms. [Pinky Sodhia, Naman Awasthib, Vishal Sharmac]

In [12], Author has made a statement ,that it is very suitably wrote that machine learning is collection of algorithms that instruct machines to follow out the jobs that are represent naturally and effortlessly by humans on a everyday basis. For example, reading, determining and labeling an email as spam; or simply looking at the atmospheric conditions and deciding an umbrella would be needed when going out; or merely acknowledging the features and attributes of a given fruit and recognizing it is apple or orange.

Machine learning allows machines to find instinctive information by using algorithms that frequently from data other than of being explicitly programmed about where exactly to look for a bit of information.

Web articles by [11] (2017) define Machine learning (ML) as an core sub-area of artificial intelligence (AI) that grant systems to follow a self-learning attitude without being programmed explicitly. John McCarthy coined the term "Artificial Intelligence" in 1956 for a new research field in the computer science domain which focused on making machines imitate human cognitive tasks.

According to a research report by Samuel (1959) it is possible to program a digital computer to learn in completely the same way as humans or animals could acquire the knowledge from real involvement which would after some time reduce the need for thorough programming try machine learning takes data and output to create a program itself.
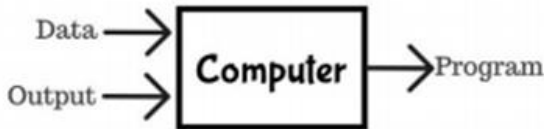
In [13] author has made a statement ,that a machine

learning researcher at TCS Research said that data accessible and computation power are two of the interesting attributes that have conduct to an large-scale use of machine learning.
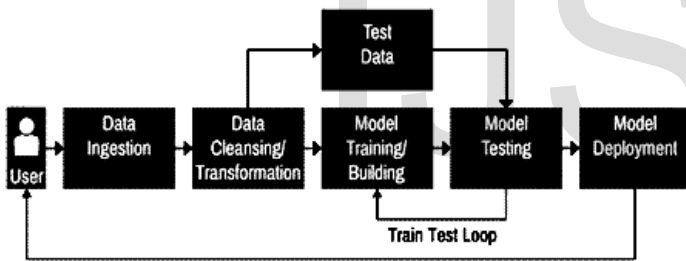
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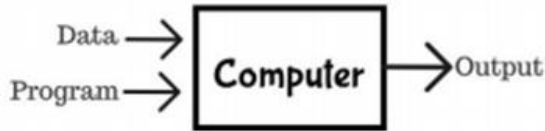
Machine Learning:

ML WORKFLOW

The sequence of workflow starts with data ingestion that is followed by data preprocessing where the valid and clean data is changed into a format that is best suited to the requirements of machine learning model used.

The Problems Solved Using Machine Learning:

Chen (2017), editor of the Eliza outcome mentioned five types of problems that can be resolve by applying machine learning:

- Classification: used to recognize the classification to which an object belongs. For example, is it junk email? Or is it cancerous?

- Regression: used to predict a continuous numeric-valued aspect related with an object. For example, the probability that a user would click on an ad or stock price prediction.

- Similarity/ Anomaly: used to regain similar objects/things or to find anomalies in behavior. For example, finding for same images or identifying duplicit in user behavior.

- Ranking: used to sort out applicable data according to a specific input. For example, Google Page Rank

- Sequence Prediction: used to predict/forecast the next element in a sequence of data. For example, predicting the next word in a sentence.

Basic Applications of Machine Learning

- Spam Filter- This application detects and filters unsolicited and unwanted messages accepted by customer and it is currently being used by Google for Gmail spam

- Sentiment Analysis- This application is used for computationally recognizing and categorizing beliefs expressed in a piece of text and it is presently being used by Twitter (Twitter Sentiment Analysis) for analyzing the polarity of a specific tweet.

- Voice Chat-Bot- This application is used for voice chatting with an AI bot and it is being used by Google as Google Assistant, by Microsoft as Cortana, by Apple as Siri and by Amazon as Alexa.

- Image Classifier- This application is used for classifying images into groups and it is currently being used in object detection algorithms.

- Stock Market Opening Price Prediction-This application is used for predicting prices of shares of a particular company listed in the stock market based on previous data of one year and ten months and it is presently using for testing.

7 CONCLUSION

We have made a survey on issues related to psychological impact on children being alone, briefed upon various research activities that have been carried out to outcome these problems ,identified Hello Barbie as one of the best solution that can be adopted with ease.

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