SIRI – APPLE's PERSONAL ASSISTANT: A REVIEW

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Abstract— Recent advances in software development and efforts toward context awareness and personalization have brought closer the long-standing vision of the ubiquitous intelligent personal assistant. This has become particularly salient in the context of smart-phones and electronic tablets, where natural language interaction has the potential to considerably enhance mobile experience. It offers more options in terms of user interface. This trend may well usher in a genuine paradigm shift in man-machine communication. This paper presents an overview of SIRI which is voice controlled assistant for Apple, technology used in it, its pros and cons and features, and finally discusses how the current implementation might evolve in the near future to best mitigate any downside.

Keywords – Context awareness, intelligent personal assistance, natural language interaction,

I. INTRODUCTION

With the advancement in the fields of artificial intelligence, Natural language processing, speech recognition, etc. different commercial products like Apple's Siri, Microsoft's Cortana, etc. have been developed, which are able to process the speech inputs and provide desired results. Now-a-days research is going in the areas of health care, navigation, translation and other areas [1], so as to incorporate the above mentioned technologies for solving different problems in an efficient and intelligent way.

A personal assistant is that person/agent who is able to provide distinct help at a given time and in a given activity context. For instance, a secretary employed in any company performs activities such as answering incoming calls, scheduling meetings and appointments, ordering products, or interacting with clients. Personal assistants possess an important characteristic of adapting themselves according to the demands of their superiors. One-to-one relationship exists between this personal assistant and the superior. The features of the digital assistants are easiness of interaction, flexibility and simplicity. Voice-based input/output interface is the easiest way to process speech inputs because voice-based interaction is usually simple, flexible and does not require cognitive efforts, attention and/or memory resources on the side of the user. Besides all the above mentioned benefits, there are many constraints of using personal digital assistants which include complexity in human

speech and varying contexts. Due to this reason all the commercial products based on personal digital assistance are only developed for a specific description.

Artificial Intelligence (AI) has been propelled into the mainstream of learning. AI has many areas like computer science, cognitive and learning sciences, game design, psychology, sociology, philosophy, mathematics, neuroscience, linguistics, defence industry, medicine and education [2]. AI uses logical series of steps called algorithms and advanced cognitive computing technologies to use the techniques of search and pattern matching for providing solutions for the demanded answers. AI is an interdisciplinary field that is used for diagnosis of illnesses, criminal identification and artificial instructions. To develop communication between human and computer, AI possesses the ability to reason while processing a natural language and has different scope of data in terms of the developments in the above mentioned fields.

AI, has some other descriptions as well. AI has the ability to comprehend, learn, solve, interpret and execute complex mental process. AI is a subfield of computer science. Natural Language Processing (NLP) is provided for human computer interaction in order to combine human learning and machine reasoning [3 − 5]. NLP is the analysis of linguistic data, most commonly in the form of textual data such as documents or publications, using computational methods.

II. SIRI

Some Apple products have built-in intelligent personal assistant-SIRI. SIRI is an offshoot of the DARPA (funded project) and CALO (Cognitive Assistant that learns and Organizes) [6]. SIRI program can help a user to schedule reminders or assist in texting, and can also do fun things like telling exactly what planes are flying above your location and their departure time. With more recent Apple products a user can go entirely hands-free by saying, "Hey, Siri."

SIRI uses voice queries and a natural language user interface to answer questions, and perform actions by delegating requests to a set of Internet services. The software adapts to users' individual language usages, searches, and preferences, with continuing use. Returned results are individualized. Third-party access to Siri, was opened up by Apple with the release of IOS − 10 in 2016, including third-party messaging applications, payments, ride-sharing, and Internet calling apps.

A. Technology used in SIRI

Siri uses Machine Learning technologies to function. Using ASR (Automatic speech recognition) to transcribe human speech (in this case, short utterances of commands, questions, or dictations) into text. Users speak natural language as voice commands in order to operate the mobile devices (iPhone 4S and later and newer iPad and iPod Touch devices) and its applications. The idea is to provide high level modelling primitives as integral part of a data model in order to facilitate the representation of real world situations.

B. Working of SIRI

The working of SIRI [7] can be explained in the following steps:

1. Voice Recognition – Whenever a person commands through his/her natural voice, the assistant must be able to convert that analog signal to digital one and then 'understand' what was being said after concatenating the keywords altogether, and finally fixing/obeying the issue/command. This might sound trivial and easy but it is the first step towards reaching the next, since without overcoming the hurdle of country-wise accents, surrounding noises, and specific voices, one cannot successfully establish its working. It also timely learns how its user sounds while speaking specific words. The speech recognition that Apple's Siri uses is 95% accurate and has really low error rate.

2. Send everything to the apple servers on the cloud – Siri does not work locally on a mobile device and eats its limited resources, but rather loads everything to the powerful computer servers so as to extend the maximum efficiency and continuously improvise. There is an algorithm that identifies the keywords and go down towards the flowchart branches (conceptually Tree data structure) that best match those keywords, so as to reach out to meaningful conclusions. If it fails, it searches for another branch. If it fails here too, it asks whether the user wants results from the Web. It hasn't reached to the point of conversational App but has numerous conditional statements in its coding that respond according to the user's action.

3. Understand what the statement implies – If you ask Siri "Is there any nearby Indian restaurant?", it will check for the same through GPS, but what if you said "I love Margherita"? Only a human is capable to understand that it is a type of Pizza, but an AI won't get it. If a coder writes code of an Artificial Intelligence, he/she must know how sophisticated a machine ought to be. Also, it must be able to recognize the difference

between words like – byte and bite, sheep and ship, dear and deer, etc. Siri is able to relate the words with each other in terms of nouns, adjectives, verbs, and sentence as a whole. For instance, if you say "How fast a deer can run?", it will obviously match these words and conclude that it cannot be "dear"; likewise, if you say "I'll bite you", it will understand that there is no possibility that it is "byte". There is nothing to get surprised by such statements. People play with something they find new and there is no wonder that they speak out loud 'any' random thought. Thus, SIRI is efficiently able to understand the context of a sentence and hence processes them accordingly.

4. *Action based on what was commanded* – Here is the most challenging thing. Siri or any other AI assistant you plan to develop must understand what you say. If it fails it might also drag you to potential dangerous situation. For instance, if you said to book a flight, it must be capable to understand this and as well interact with other Apps to perform the given task. Plus it must not interact with those sites that aren't your interest, especially those that involve credit/debit card payment. One might get doomed if the assistant doesn't serve appropriately.

There are other voice assistants as well but they haven't reached to the standard of accuracy SIRI currently has, yet!
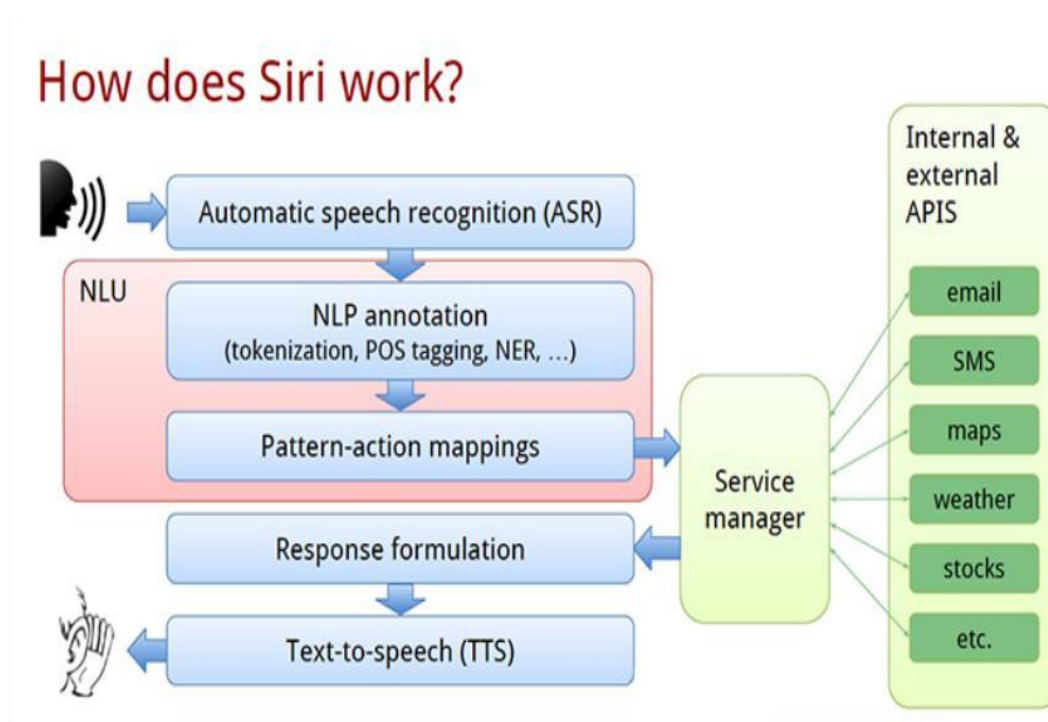

Fig. 1 Working of Apple's Siri

C. *Features of SIRI*

A wide range of voice commands are used to interact with SIRI [8]. These commands are as follows:

- Phone actions, such as "Call Sarah", "Read my new messages", "Set the timer for 10 minutes", and "Send email to mom".
- Check basic information, including "What's the weather like today?" and "How many dollars are in a Euro?".
- Schedule events and reminders, including "Schedule a meeting" and "Remind me to".
- Handle device settings, such as "Take a picture", "Turn on Wi-Fi", and "Increase the brightness".
- Search the Internet, including "Define...", "Find pictures of...", and "Search Twitter for...".
- Navigation, including "Take me home", "What's traffic like on the way home?", and "Find driving directions to...".
- Entertainment, such as "What basketball games are on today?", "What are some movies playing near me?"
- Engage with iOS-integrated apps, including "Pause Apple Music" and "Like this song".

SIRI was initially limited to female voices, but in June 2013 Apple announced that SIRI would feature a gender option, adding a male voice counterpart.

With the announcement of IOS – 10 in June 2016, Apple opened up limited third-party developer access to Siri through a dedicated application programming interface (API) [9].

D. PROS AND CONS OF SIRI

The advantages of Apple's Siri are listed as:

- Siri's original release on iPhone 4S received praise for its voice recognition and contextual knowledge of user information, including calendar appointments.
- Siri is an easier, faster way to get things done.
- Siri is always with you on your iPhone, iPad, Mac, Apple Watch, and Apple TV-ready to help throughout your day.

The imperfections in Apple's Siri are:

- Siri's original release on iPhone 4S was criticized for requiring stiff user commands and having a lack of flexibility.
- It was also criticized for lacking information on certain nearby places, and for its inability to understand certain English accents.
- A number of media reports have indicated that Siri is lacking in innovation, particularly against new competing voice assistants from other technology companies.

III. CONCLUSION AND FUTURE

In this paper we presented a detailed view of Apple's Siri, which is a personal digital assistant in almost every Apple product. We concluded that, Siri (speech-recognition) is personal assistant that's built into all Apple iPhone 4S smart-phones. The software isn't an "app" in the iPhone sense, meaning it's not something you can download from the App Store. Currently Siri is the name for an ultimately different and new path of handling Apple Phone. Siri is a speech-recognition computer application. It has both speech input and output, meaning you can speak to it, and it can speak back to you.

Also, in future following enhancements will be done in Apple's Siri:

- Siri's standalone speaker will be launched by Apple soon that will help Apple better compete against the likes of Google Home and Amazon Echo.
- An enhanced version of Siri will be introduced in Apple's 2017 iPhone models.
- Apple will update Siri's voices for more clear, human voices and language translation, and additional third-party actions with the upcoming release of IOS 11.
- Siri is introducing an upgraded user interface, with a "more natural and expressive" voice.

Siri will also take note of the activity across the OS, displaying things of interest in news, providing a location for an appointment or assisting in making a calendar appointment.

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