Latest Advances of Natural Language Processing and their Applications in Everyday life

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ABSTRACT

Natural language processing (NLP) area of Artificial Intelligence (AI) has offered the scope to apply and integrate various other traditional AI fields. While the world was working on comparatively simpler aspects like constraint satisfaction and logical reasoning, the last decade saw a dramatic shift in the research. Now large-scale applications of statistical methods, such as machine learning and data mining are in the limelight. At the same time, the integration of this understanding with Computer Vision, a tech that deals with obtaining information from visual data through cameras will pave way to bring the AI enabled devices closer to a layman also. This paper gives an overview of implementation and trend analysis of such technology in Sales and ServiceSectors.

Keywords— *1. Natural Language Processing (NLP) ,Artificial Intelligence (AI),ComputerVision,Data Mining and MachineLearning .Sales and ServiceSectors*

INTRODUCTION

Natural Language Processing (NLP) as we know today has evolved over decades. Coding a device into understanding what a human speaks is challenging because, the process of speech is ever changing and there are no certain rules that control the usage of a language.

Same is the case with Computer Vision (CV), a technology that deals with identifying objects/humans by reading and understanding visual information, as two objects that essentially fall in the same category in real life are almost never similar. These technologies, as a part of Artificial Intelligence, are the source of latest updates in all tech related products and services. In sales and service sectors, these technologies find various applications like security, chatbots, self-driving cars besides fake news detections, personal assistants (like Google Home and Alexa) and facial recognition technologies. This paper discusses the attitude of public towards implementations of these technologies in various day-to-day use devices through a sample survey conducted on a small set of audience. Also, the challenges and scope of future products in the field are analysed based on the data from the survey.

1. OBJECTIVES OF THESTUDY

To collect feedback about the satisfactory levels of public in using NLP and CV equipped devices (or services) To analyse and interpret the data from the survey regarding future development andapplication.

LIMITATIONS OF THESTUDY

A. The sample size for the survey is very smallcompared to the total number of consumers of the products (or services).
B. The survey is intentionally biased towards students (age group 15-25) to facilitate discussion of future scope although users above the age of 25 form a significant part of consumerworld.

Applications A sample survey was conducted among audience from different age groups and backgrounds, mostly young students in their early 20s. The target was young audience as in the 21st century each and every product (or service) is custom made to be liked by the millennials. Although the participating audience in this survey is less, the feedback can reflect a bigger section of public within the same age group and profession. The survey was conducted using the questions listed in the Annexure-A.
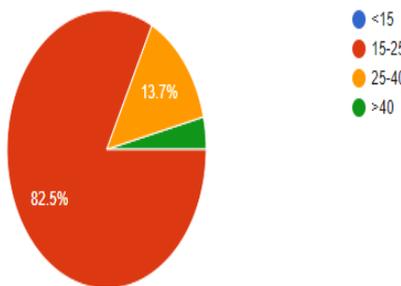
Age Group

80 responses

- <15
- 15-25
- 25-40
- >40

Fig. 1 Pie chart showing age group of the respondents to the survey.

82.5% were in the age group of 15-25.The part of the chart represented by Orange colour had professionals from technological background.

The survey consisted of questions intended to know to what extent the people are satisfactorily using very common products (or services) that find an application of either Natural Language Processing or Computer Vision or both in them. This survey will thus highlight the attitude of the public towards such products (or services) thus giving a scope to understand their views and make/design the upcoming updates by paying a close attention to the user feedback.
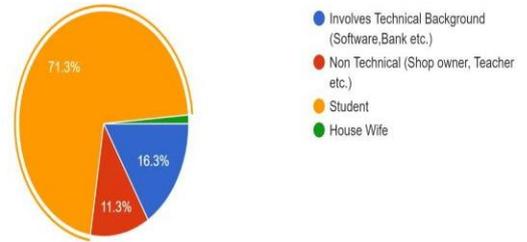
Profession

80 responses

- Involves Technical Background (Software,Bank etc.)
- Non Technical (Shop owner, Teacher etc.)
- Student
- House Wife

Fig.2 Pie chart showing the professional background of people who participated in the survey.

A. Findings/Outcomes

Almost the whole set of audience, being students, own a smart phone and have at least basic knowledge of using it. To summarise, the respondents agreed to the fact that the services offered using Natural Language Processing algorithms do not deliver the required output in various cases.

How often does Google Assistant or SIRI give you appropriate answer?
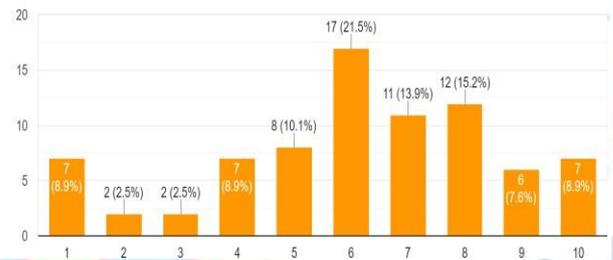
79 responses

Fig.3 Graph depicting number of respondents on y-axis and rating points from 1-10 on x-axis.

The maximum number of respondents mentioned that NLP programmed services like Google Assistant and SIRI give appropriate answers around 60 percent of the times.

How often does the issue get resolved at chat bot level?
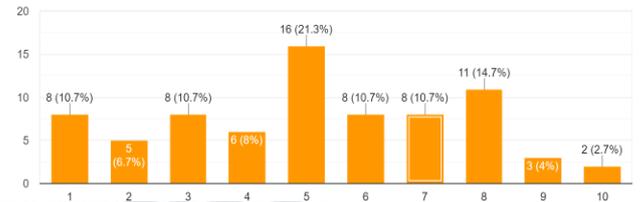
75 responses

Fig.4 Similar to the results of Voice Assistant 57.3 percent of respondents, chatbots of various companies that initiate a conversation with customer do not solve the issue in at least half the cases. This leads to further escalation to a humanoperative.

To improve the efficiency of services, say a chat bot, millions of real-life situations must be given to train. Manufacturers/service providers seek these training materials from their users (with

authentication from the user) which is discouraging the users to use the product (or service) given the concerns about the user data.

Do you grant permissions to apps to read your data like location, google assistant chat etc?
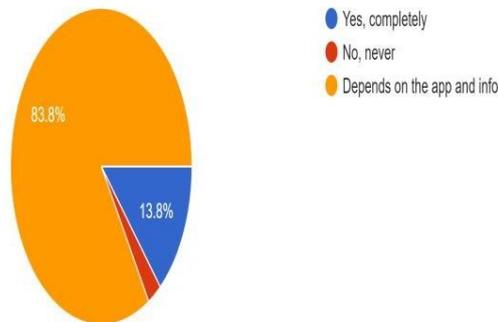80 responses

Fig.5 Given the various data breaches of well-known companies in recent times; the responses have highlighted that goodwill of the company is of utmost priority for users to grant access to their information.

Would you like devices taking your facial data for recognition?
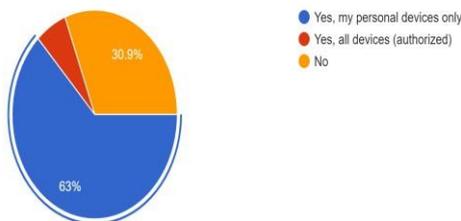81 responses

Fig.6 Facial data is one of the most sought by apps installed on smartphones along with access to contacts, media etc. Here all devices meant the ones that are, for example, proposed to be installed in airports across India to facilitate faster boarding.Most of the respondents were more comfortable if the information is sought by their personal device and is only meant for personal use.

(Imaginative Question) Would you like to be received at a shop by a device/robot that identifies you?
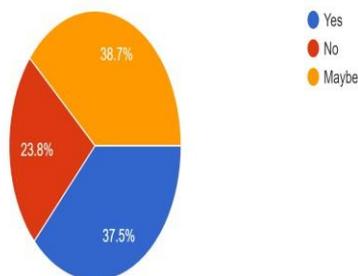80 responses

Fig. 7 Pie chart showing the mixed response of audience with most of them agreeing partially to question asking if they would like a device (or robot) to welcome them at a shop.

Millennials always look forward for new updates and latest technology. For an imaginative question, the audience responded saying that they might welcome a move with robots programmed to identify and talk to them in a shop/office. This would be the amalgamation of both the technologies, namely Natural Language Processing and Computer Vision.

INTERPRETATION OF DATA

Retail, agriculture, healthcare, automobile and banking are some of the clusters under which CV and NLP can be employed. Technologies like NLP and CV have two types of customers-the manufacturers and the users. While manufacturers use them to make the process of production efficient, users use products (or services).

A. ServiceSector

Service sector is the largest contributor to the global economy. This sector in 21st century is driven by technological updates with more focus on surpassing the competitors to deliver what the target audience want by operating in such a way that the needs are met at a minimal cost. The adoption to newer technologies will reduce the operational costs and simultaneously improve efficiency.

Natural Language Processing has already found its way into Service Sector for various applications like customer service. NLP from business point of view can be used to obtain information that answers questions like: How can I keep my customers happy? In what ways are my competitors performing better than me? etc. Various organisations around the world, look for the development of humanoid robots to hire them for various non-decision-making roles that involve interaction with people. For this task, NLP is the firststep.
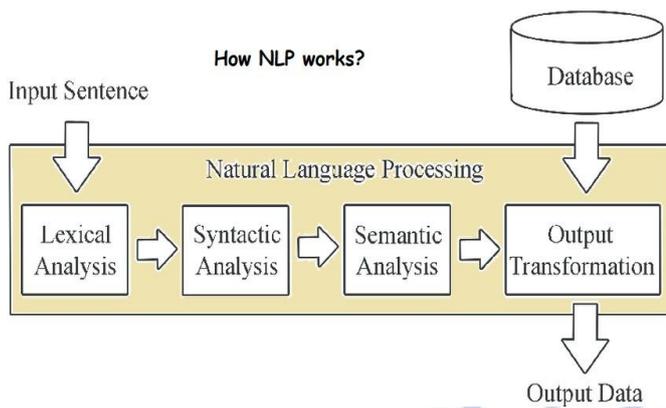
Fig.8 A representation of different steps involved in processing a data set through the NLP programming algorithm

The computer system understands the given input the same way in any case. But while employing it in service sector especially, the way the output is processed must vary according to the situation so as to guarantee customer satisfaction. The use of words that propagates positiveness must be used so as to build a rapport with the customer by inferring their mood and preferences from the words they use. This requires extensive training and again arises a need to get real life situations to develop thealgorithm.

Computer Vision on the other hand, is growing at a faster pace than NLP due to its ability to quickly mature. This is possible due to the advances in hardware as CV is highly dependent on quality cameras and the equipment within. From the survey, it is important to note that smartphone is a very common gadget and its usage is also understood by everyone. So, any update or service provided on this platform is more likely to reach the customer easily and also people tend to use it more often. One added advantage of releasing services through smartphone is that it is easy to persuade the customer (mostly young people) to go an extra mile and spend extra money if the features are trendy and promising. For example, Apple sold 37 million units of its iPhone 11 (priced at Rs.64,900 in India at the time of release for the least variant) in 2019.[8][9]

Work on these technologies is in testing stages. Few ideas like detection of fake news with NLP, facial recognition in mobile phones have already reached the market. A few other installations to facilitate cashier-less checkout, stopping shoplifting by using cameras that can detect products inside the shopping cart are under test. If people who gave responses to the Sample Survey are willing to accept a robot to welcome them, it is quite possible that they will also like these because of their hassle-free nature. Simple applications like traffic signals that are triggered by amount of traffic on either side will surely draw appreciation from user
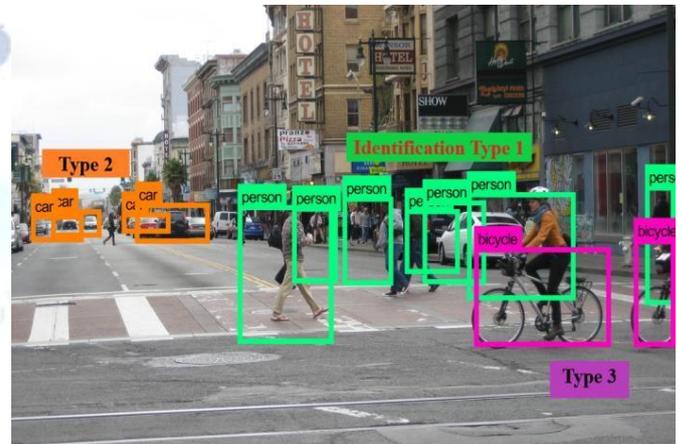

Fig 9. An illustration of how a Computer Vision technology interprets the visual data. Each type of identification is taught to the system using various input.

B. SalesSector

Sales/Manufacturing find excessive use of NLP and CV to automate processes at production facilities and warehouses. This is good as it would otherwise cost hundreds of person work hours. But these applications are not driven entirely by end-customer feedback. These can be rather implemented without the feedback from users as there is no direct interaction between the machines and consumers. It is only important to make sure the end-product is manufactured with precision by the machine. Computer Vision is also being developed by Tesla and Google to make self-driving cars. Drones fitted with cameras in collaboration with CV can make warehouse management way easier by maintaining inventory list by flying around to capture images from which count and location of items is inferred. A similar approach has been, in reality, tested by Amazon in its offline-store. In agriculture also, CV can be used to analyse the yield and growth of plants. Natural Language Processing is also used simultaneously with CV where customers are present, for example, selling a product, where NLP is programmed to use inputs from CV to analyse the reactions and respond into closing the deal at theearliest.

CONCLUSIONS

After making several tasks online and thus facilitating work from home, now we are moving towards making the same tasks hand-free. Natural Language Processing and Computer Vision can cater the diverse needs of the industry as well as the customers. When applied together, these have unimaginable potential. This realisation has made top-notch companies like Google and Facebook invest into developing them further.[1] These companies have put customer safety in first priority over customer satisfaction as any malfunction of these systems might lead to them reacting in ways that are not predictable. The fatal crashes of self-driving cars under test reiterates the same.[2] Nevertheless, human interaction at various levels like to monitor, to train the algorithms and to assist humans is constantly required while using these technologies. The human society must accept, that at this point of time, neither NLP nor Computer Vision are close to achieving human-level common sense which is the reason for less satisfactory levels amongusers.

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ANNEXURE-A

Questions included in the Sample Survey:

1. Age Group
2. Profession
3. Do you own a personal SmartPhone?
4. Do you have basic knowledge of using phone? (like pay bills/recharges)
5. How often does Google Assistant or SIRI give you appropriateanswer?
6. How often do you contact customer care? (allservices)
7. How often does the issue get resolved at chat botlevel?
8. Would you like devices taking your facial data for recognition?
9. Do you grant permissions to apps to read your data like location, google assistant chatetc?
10. Are you concerned about your data privacy while sing IoT devices? (like Alexa, facialrecognition
11. Would you like to be received at a shop by a device/robot that identifiesyou?