

# **ENHANCING IT SUPPORT THROUGH ARTIFICIAL INTELLIGENCE AND AUTOMATION**

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## **Abstract**

Artificial Intelligence and IT automation are poised to be a challenging area of IT to change the dynamics of industry and society. This is evident from the past to present innovations. AI has systematically made our services not only intelligent but highly smart. This paper is an effort to assess productivity and efficiency gain with the use of AI and IT automation. The study has been conducted in a department providing IT support to the Government of Mauritius. The main hypothesis is to test 'smart services lead to the minimisation of downtime and an increase in the overall productivity of an organization'.

## **Keyword**

Artificial Intelligence, IT Automation, Smart Services, Productivity, Innovation.

## **1. INTRODUCTION**

From Science-fiction to reality, Artificial Intelligence (AI) has made tremendous progress in various fields like strategy game playing such as chess, natural language processing, robotics and image analysis, among others. With the capability of machines to imitate intelligent human behavior, intelligent software and machines have already found their way to help human beings in mundane tasks like cleaning the house, typing of documents through voice commands, self-driving cars and analyzing soil and atmosphere in distant planets. Europe and the US have already taken the lead with a strategy in AI and China is well poised in the race.

In Mauritius, the Government has recognized the potential of AI and has decided, through the Budget Speech 2018/19, to set up a Mauritius Artificial Intelligence Council (MAIC), comprising members from the public and private sectors as well as international experts to spearhead and drive AI-related activities and advise the Government on the way forward. In order to realize this ambitious goal, several initiatives have to be undertaken within a well-planned strategy. A Mauritius Artificial Intelligence strategy (2018) has been launched and is expected to chart the way forward towards creating a smarter Mauritius. This plan can also complement measures in the Mauritian Digital Mauritius strategy. However, discussions will need to be held at the level of all sectors to ensure that a coherent approach is adopted in order to benefit the entire population.

## **2. PROBLEM STATEMENT**

An increase in productivity and efficiency is continuously being requested by the citizens. Lack of staff and particularly skilled workforce are challenges to be surmounted. This research has been undertaken in one IT support department to find out the extent to which AI and automation can help in resolving the problem.

## **3. AIM AND OBJECTIVES**

The aim of this paper is to explore the gain in efficiency and productivity with AI and IT automation tools in one department in the Government of Mauritius with a view to enhancing its services to its clients, namely Ministries/ Government departments and the public. The Government has already taken the challenge by announcing the setting up of the MAIC in its budget measures (Jugnauth, 2018). This measure is expected to bring important benefits to the Government.

The objectives are as follows:

- 1) To conduct an in-depth study with respect to AI and IT automation tools in one department of the Government of Mauritius.
- 2) To assess the increase in efficiency gain in the department.
- 3) To assess the increase in productivity in the department

- 4) To make recommendations based on the study for other organizations.

These objectives will be explored through the following research questions:

- (i) What are the tools being used for AI and IT automation?
- (ii) What are the benefits obtained with the tools?
- (iii) How can the result be extrapolated for other organizations?

#### **4. LITERATURE REVIEW**

IT Automation and AI have contributed towards reducing human efforts in repetitive work. Since Professor John McCarthy coined the term Artificial Intelligence (Yunhe, 2016) in 1955 at the Dartmouth Conference, this field went through ups and downs and had known the AI winter and spring before recently making a major breakthrough. IBM, Google, Apple, and Amazon have positioned themselves as giants with innovative solutions.

IBM has asserted its position among the leaders with its Deep Blue Chess-playing machine defeating the World Champion, Garry Kasparov in 1996. Not long ago, IBM has also been in the limelight with Watson in the Jeopardy game, showing that AI is a challenging area to be explored further. The adoption of AI and IBM Watson has also been studied in China's Public Health Care (Qian Sun and Medaglia, 2018) to explore the challenges and concerns of the technologies involved.

The AI spring has led to many promising avenues with developments in Natural Language Processing, machine vision systems, computer games, machine learning, rainfall prediction (Dasha *et al.*, 2018) and robotics, to name a few. Siri has been the preferred virtual assistant for many Apple lovers. Amazon and Google have followed with voice recognition trends giving rise to Alexa and Google Home. In the education sector, intelligent tutoring systems (Chassignol *et al.*, 2018) create a digital profile of a student and provide him with a personal tutor. This has the effect of enhancing the learner's experience while bridging any gap in teaching. The AI tutor is, therefore, not a too distant innovation to help students further in their studies.

AI techniques for natural language processing has been very successful with voice recognition, language translation, and interaction with human beings. The use of google translate and bing translate come at the rescue of those requiring translation of text from one language to another in a matter of seconds.

The emergence of Deep Learning technology employing neural networks has given a strong push to AI. The release of Tensorflow in 2015 as an open-source machine learning framework (Tensorflow, 2018) has made it simpler and more efficient to implement innovative machine learning systems. As such, more and more AI systems are expected to be released as open-source as well as commercial products to assist in various fields like healthcare, agriculture, weather forecasts, business and Government among others.

Notwithstanding the above-mentioned success of AI, research on AI is still scarce as well as the advance of this technology in the public sector (Gomes de Sousa *et al.*, 2019). This explains the reason for a case study approach in this paper.

IT Automation has also been of vital help in enhancing man-machine interaction. The recent development of Robotic Process Automation has led to further assistance. According to Janssen *et al.* (2019), one can expect radical changes to human-automation interaction. Eubanks (2019), as well as Duffey (2019), have asserted that AI can support the business. Therefore, AI and automation hold the promise for benefits in the public sector as well as in business.

While some people view AI as an opportunity for technological revolution and the industrial revolution (Beijing Review, 2018), others are concerned about the threats. The United Nations has recognized the role AI can play in the achievement of the sustainable development goals to address the specific global challenges related to poverty, hunger, health, education and environment, among others (New American, 2017).

AI tools have developed very fast once it has been found to be successful in various areas. The potential of AI was particularly demonstrated with the IBM Deep Blue Chess program and Jeopardy. Successful applications have been noted in the area of Natural Language Processing. Among such applications, Google translate, summarization tools and speech recognition have been very popular.

Many applications relied on well designed and established algorithms. Recently, machine learning has emerged as a challenging technology, whereby applications are fed with a massive amount of data and are allowed to learn and come up with models to make predictions. As such, machine translation, image recognition systems have become more robust than their predecessors. Similarly, Business Intelligence has developed further with AI techniques, building on a huge amount of data to provide better forecasts of trends in the Business sector.

Chatbots are progressively replacing or complementing the duties of help desk officers in replying to queries using both voice and text. Many IT companies like Microsoft, IBM, and Oracle have come up with chatbots to provide businesses with an innovative way to connect with clients on a round-the-clock basis. According to Androutsopoulou *et al.*, (2018), chatbots and other types of AI solutions (e.g. machine learning algorithms, process automation and image recognition software) can significantly reduce the administrative burden of public organizations and advance the communication between government and citizens within the provision of public services.

The government has already kept massive amounts of data that can be analyzed for trends through data analytics. Such forecasts/predictions will be useful in the fields of health, education, tourism, agriculture and meteorology among others. The use of AI and analytics in rainfall prediction in Kerala, India (Dasha *et al.*, 2018) has already demonstrated success. Recommender systems have also been successful in sales and are regularly used by ebay.com and amazon.com. In Mauritius, the tourism sector can lend itself to the use of such technologies as the island relies a lot on tourists.

## **5. RESEARCH METHODOLOGY**

A case study approach is chosen to have an in-depth study of the influence of AI and automation in the selected organization. The aim of this paper is to explore the AI and IT automation benefits with respect to productivity and efficiency. A telephone interview and a survey were conducted with two experts, forming a focus group, manning the automated systems and Artificial Intelligence initiatives. The results are analyzed in this paper.

## **6. ADOPTION OF AI IN THE GOVERNMENT OF MAURITIUS**

With the release of the projects under the budget 2018 – 2019, AI and data analytics for effective reporting (Budget 2018-2019, 2018) have been identified for implementation to kick-start some initiatives. The chatbot is one initiative that can be effective for the Government to interact with the citizen. Currently, interaction is mainly by phone and non-availability of staff in most Ministries and departments after normal Office hours leads to a disruption in service. Even during normal office hours, the citizens may encounter difficulties in reaching a Government Officer by phone. The citizens, very often, seek the intervention of private radio companies, where the problems are exposed to the public. The Government, being conscious of such difficulties encountered by its citizens, has set up a citizen support portal (CSU, 2018) to assist further in resolving problems. Through the portal, the problems faced are submitted and the department responsible channels the problem to the Ministry/department concerned. A reply is provided in the shortest delay possible and this is monitored at the highest level in Government to ensure that citizens' concerns are addressed in a timely manner. The use of chatbots for citizens to interact with the Government can provide an alternative channel of communication and the advantage is the round-the-clock service. A chatbot is already under test on one Government portal at the link [www2.govmu.org](http://www2.govmu.org).

Pending the establishment of the MAIC, one department of the Government has already embarked on the use of AI and automation tools. This department has undertaken initiatives to assist in the improvement of its operations. The department is responsible for providing ICT support services to the entire Government as per its mandate. The name of the department has been mentioned as IT Support Department in order not to reveal the real identity for confidentiality purposes.

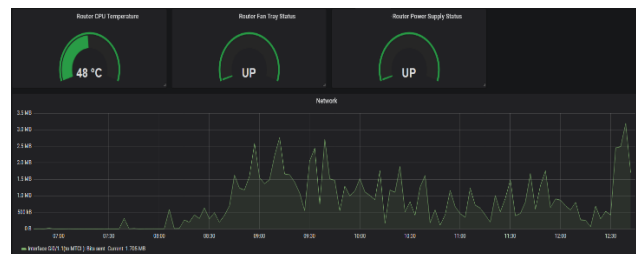
So far, AI tools related to natural language processing have been used. Initially, Dragon Nuance was purchased to help in typing work. However, the time required for training of the software has been a major constraint. The software required to be trained for different persons due to the uniqueness of their voice. Dragon Nuance was subsequently discarded and the dictation facility provided under google docs was adopted. Google docs did not require training and it readily accepted the Mauritian English accent. In another organization, otter.ai has been adopted for real-time speech-to-text creation of documents. These speech-to-text tools have been found to be very useful for document creation as they eliminated the need for typists, especially when this personnel has become scarce in the public sector. Anyone can create his own document by talking through the microphone already integrated into notebook computers or tablets.

Collation of documents has traditionally been performed by two persons, one reading the document and the other one carrying out the verification. With the text-to-speech facility available in Microsoft Word, a single person can verify a document by allowing the software to read the contents.

Further innovation has been undertaken with the use of software agents to monitor the status of servers and critical applications at various sites. Applications for various Ministries and Government departments are installed at different sites and also in a data center. For a long time, these systems were in operation without dedicated staff monitoring them. This led to a fire-fighting state of intervention, creating disruption in service. It was found that having a system to provide necessary alerts, could prevent downtimes. As a result, a system based on the open-source software Zabbix and Grafana was developed and configured to monitor some of the computer systems. The screenshots showing the interface is shown in figure 1 and 2. The IP address has been erased for security and confidentiality reason.



**Figure 1: Screenshot showing status of some servers and CPU load**



**Figure 2: Screenshot showing temperature, fan status, power supply status and bandwidth utilization of communication line**

The system has been very helpful to pro-actively address problems related to hardware, software and communication lines. The shortage of staff does not allow dedicated staff at each site to monitor the performance of their systems. Having dedicated staff monitoring systems at various sites is also not an efficient approach to adopt.

## **7. ANALYSIS OF INTERVIEW AND SURVEY RESULTS**

The telephone interview and survey conducted with the two experts revealed that major benefits resulted from the use of AI tools and IT automation. The results are as follows:

- (i) A custom application was developed for a command and control center to proactively monitor the performance and availability of critical systems running at 10 sites in the Government through the use of agents and Simple Network Management Protocol (SNMP). An intelligent sensing mechanism is being used and also all stakeholders are notified through email, SMS and also on Slack, a free collaboration platform, whenever pre-defined thresholds have been reached. The focus group revealed a 75% reduction in the time of intervention.

- (ii) The features called 'Speak' in Microsoft Word and speech recognition in Google Docs have been used to help the staff of the Human Resource cadre to efficiently and effectively collate documents and draft official letters without any typographic mistakes. In the case of HR staff, 75% of the reduction in the time of producing documents was achieved.

Based on the use of AI and IT automation, the focus group strongly agreed to the following:

- (i) The use of AI and IT automation tools in the Government of Mauritius
- (ii) Minimization of downtime of Computerised Systems through the use of smart services
- (iii) Increase in productivity with the use of smart services.

An analysis of the above results reveals that there is a gain in efficiency and productivity with the use of AI and automation tools. A widespread and well-planned selection and adoption of such tools is expected to improve the efficiency and productivity of the department in providing IT support to other Ministries and Government departments.

## **8. FUTURE DIRECTIONS WITH AI AND IT AUTOMATION TOOLS IN GOVERNMENT OF MAURITIUS**

After taking cognizance of the benefits of the Zabbix system for monitoring of servers, communication lines, and applications, it has been decided to include most of the computerized systems in Government. The alert systems with that automation system will ensure monitoring round-the-clock. The use of intelligent software agents is expected to bring more benefits in the monitoring process. Depending on the criticality of the systems and nature of alerts, the type of intervention (immediate response or not) can be determined. With such an alert system, there is no need for staff to be present and man the center after normal office hours, but they can be available on-call. This will ensure efficient use of staff force and reduction in the cost of operation.

The second AI project being undertaken is the use of chatbot for the help desk to support the provision of ICT support services to Ministries and Government departments. Collaboration with Oracle corporation was secured and an alternative channel of communication was established using a chatbot. Since the service is not free from Oracle, a new one making use of an open platform is under development. It is expected the chatbot system will become an efficient system to provide answers to common questions that are asked by clients.

One more project, namely a recruitment alert system is under test. Vacancies are advertised from one website of Government, where job seekers have to visit regularly the website. Job seekers often missed some jobs given the deadline specified. Job seekers will soon have the possibility of downloading an app on their mobile phones and receive alerts for jobs matching their profiles.

More projects will be identified in order to assist in the delivery of services to the public. With the tangible benefits obtained, it is expected that major gain in efficiency and productivity can be achieved Government-wise.

## **9. CONCLUSION**

AI is becoming a pervasive area for innovative products and services. Many tools are already available and can be readily configured and deployed. In the Government of Mauritius, it is expected that AI tools will bring efficiency in the delivery of services to the public. The Mauritius Government is already taking measures to include AI as well as IT automation tools in its agenda for the development and transformation of its services. Chatbots and natural language processing are already making their way. In this paper, the case of the department providing ICT support services has been considered with the use of AI technology. It is expected that more tools will be identified in the future. Business Intelligence and analytics will further transform the landscape of the Mauritian Government. Since AI and automation are finding their way in Government and business, further research can reveal their success and also create awareness on their importance in improving services.

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