



Artificial intelligence applications in mobile devices

Serri Ismael Hamad

University of Thi-Qar, College of Education for Pure Sciences, Iraq

E-mail: serriismael@utq.edu.iq

Abstract

The main objective of this research is to analyze the different uses of Artificial Intelligence (AI) in mobile devices. AI is defined by several authors as the most advanced computer science that exists because it improves any field where it is applied; It offers improvements in multitasking activities, the reproduction of the highest quality colors and provides a much smoother user experience. In the execution of the document, the proposed objective was met, for which empirical methods were used as instruments and techniques in data collection, theoretical methods in synthesizing the antecedents of the analysis synthesis and determining the limitations, insufficiencies, shortcomings and potentialities in the development of research through induction-deduction, in addition to the respective bibliographic review for the validation of the theoretical basis. The Statistical mathematical method was used from the construction of graphs and the inference of results of the scientific investigation from which the following specifications were obtained; In the survey applied to 80 people, 96% of the population taken as a sample owns a smartphone, in the development of the research the lack of information in the definition of the terms was found to be a gap, as the results of the statistics are controversial. Therefore, AI in mobile devices improves processors allowing to open applications quickly, it also offers multitasking activities that allows creating a fascinating experience for users despite their lack of knowledge.

Keywords: analysis, application, experience, users.

تطبيقات الذكاء الاصطناعي في الأجهزة المحمولة

سرى إسماعيل حمد

جامعة ذي قار \ كلية التربية للعلوم الصرفة \ قسم علوم الحاسبات

ملخص

يهدف هذا البحث بشكل رئيسي إلى تحليل الاستخدامات المختلفة للذكاء الاصطناعي في الأجهزة المحمولة. يُعرّف العديد من الباحثين الذكاء الاصطناعي بأنه أكثر علوم الحاسوب تطوراً، إذ يُحسن أي مجال يُطبق فيه؛ فهو يُحسن أداء المهام المتعددة، ويُعيد إنتاج الألوان بأعلى جودة، ويُوفر تجربة مستخدم أكثر سلاسة. وقد تحقق الهدف المقترح من خلال تنفيذ هذه الوثيقة، حيث استُخدمت الأساليب التجريبية كأدوات وتقنيات لجمع البيانات، والأساليب النظرية في تجميع مقدمات التحليل والتوليف، وتحديد القيود والنواقص والعيوب والإمكانات في تطوير البحث من خلال الاستقراء والاستنتاج، بالإضافة إلى المراجعة البليوغرافية ذات الصلة للتحقق من صحة الأساس النظري. واستُخدمت المنهجية الإحصائية الرياضية، من خلال بناء الرسوم البيانية واستنتاج نتائج البحث العلمي، والتي استُخلصت منها الموصفات التالية: في استطلاع رأي أجري على 80 شخصاً، تبين أن 96% من العينة يمتلكون هواتف ذكية. وخلال تطوير البحث، وُجد نقص في المعلومات المتعلقة بتعريف المصطلحات، إذ إن نتائج الإحصاءات مثيرة للجدل. لذلك، يُحسن الذكاء الاصطناعي في الأجهزة المحمولة أداء المعالجات، مما يسمح بفتح التطبيقات بسرعة، كما يُتيح أنشطة تعدد المهام، مما يُتيح للمستخدمين تجربة شبيهة رغم قلة معرفتهم.

Introduction

The existence of Artificial Intelligence arose from some works published in the 1940s that did not have a great impact, but from the influential work in 1950 by Alan Turing, a British mathematician, who published the article "Computing machinery and intelligence" in the Mind magazine, where he presented an experiment that came to be called the Turing Test that proposed a method to determine if a machine could think and be able to surpass the human being, research that gave way to a new discipline of information



sciences[1].

However, many researchers and historians consider that the starting point of modern artificial intelligence was in 1956, when the fathers of modern artificial intelligence, John McCarty, Marvin Misky and Claude Shannon formally coined the term “Artificial Intelligence” during the Dartmouth conference, as “the science and ingenuity of making intelligent machines”.

Nowadays, the term Artificial Intelligence (AI) has expanded into sectors where it had not been used until now, such as in the new tools of electronic devices and mobile devices, where Artificial Intelligence offers functions that help improve the user experience and performance of the devices themselves, by managing the resources that the phone has and processing the information stored in them.

The importance of this research is to demonstrate the most advanced computer science that exists, “Artificial Intelligence” that improves any field where it is applied, in mobile devices it allows applications to be opened more quickly, offers improvements in multitasking activities, in the reproduction of high quality colors and in general provides a much more fluid user experience of the mobile device, the purpose of this work is to demonstrate the use of Artificial Intelligence in mobile devices, which is why this research proposes that new functions of Artificial Intelligence be discovered over time, not only with its improvements in mobile devices but also in other fields where it can be implemented.

Thanks to the analysis of the research, it is concluded that the use of Artificial Intelligence in mobile devices is favorable because it improves the functions of mobile devices by integrating them, making them smarter, more efficient and hundreds of times faster to improve the user experience, turning them into the most advanced smart electronic devices that exist with characteristics of Artificial Intelligence that manage to make the mobile device know how the user behaves, to the point of knowing what they want, how they want it and when.

Development

The objective of this research is to analyze the different uses of Artificial Intelligence in mobile devices.

What is Artificial Intelligence? Artificial Intelligence (AI) “is the simulation of human intelligence by machines. It is the combination of algorithms designed with the purpose of creating machines that have the same capabilities as human beings” [2]. A technology that still seems distant and mysterious to us, but that for a few years has been present in our daily lives at all hours.

Artificial Intelligence “is the discipline that tries to create systems capable of learning and reasoning like a human being, that learn from experience, find out how to solve problems under given conditions, contrast information and carry out logical tasks”[3], Which focuses on emulate the way of thinking and reasoning of humans and has notable advantages over it thanks to its speed and computing capacity.

What are mobile devices? A mobile device is also known as a “pocket computer or handheld computer, it is a type of small computer, with processing capabilities, with an Internet connection, with memory, designed specifically for a function, but that can carry out other more general functions” [4].

A mobile device is “a small device, with some processing capabilities, with permanent or



intermittent connection to a network, with limited memory, which has been specifically designed for a function, but which can carry out other more general functions”[5]. According to this definition, there are many mobile devices, from portable audio players to GPS navigators, including mobile phones, PDAs and Tablet PCs.

Mobile operating systems

A mobile operating system is a system that controls a mobile device, “Mobile operating systems are much simpler and more oriented towards wireless connectivity. As mobile phones grow in popularity, the operating systems they run on become more important”[6]. The battle between the different mobile operating systems has been fought between iOS and Android, with more and more players willing to take a share of this market. The most important mobile operating systems on the market are:

iOS: It is a closed operating system, it has a battery consumption monitoring system. It allows us to install a third-party keyboard and includes shortcuts to send photos, videos, voice notes, share your location, better management of group conversations and a mute option. According to Ortiz, “Version 10 of Apple’s operating system is getting closer, and there are many doubts that it raises, even among its staunchest defenders” [7].

Android: It is open source and based on Linux. It adapts to different screen resolutions, supports HTML, HTML5, Adobe Flash Player, among others, and has a large catalog of applications to download, free and paid. Ortiz describes that it is “The number one operating system in market share will offer some very attractive features in its new version, called ‘Android N’. Google has decided to release this version earlier than expected, with the aim of implementing it on the largest number of devices as soon as possible” [7].

How does artificial intelligence work on mobile devices?

Technological evolution has allowed the arrival of new tools to electronic devices such as smartphones. One of the most used and increasingly gaining strength is Artificial Intelligence, a concept that has ceased to be seen as futuristic and distant to come to life in everyday life. Thanks to the so-called AI, mobile devices offer functions that help improve the user experience and performance of the devices themselves, by managing the resources that the phone has, as well as processing the information stored in them. Currently, Artificial Intelligence is applied in different aspects of smartphones and will become more important over the years, so much so that by 2027, 80% of phones will be equipped with AI. equipped with some type of AI, according to the research firm Gartner. When people talk about the arrival of artificial intelligence to cell phones, they refer to processors with neural processing networks. In these cases, artificial intelligence is embedded in the heart of the phone and is what allows the mobile, among many other things, to choose how to manage its resources to function in the best possible way [8].

Types of artificial intelligence functions in mobile devices

Defines the following types:

- Real-time image identification: Thanks to Artificial Intelligence, smartphones with processors that integrate AI are capable of identifying a certain number of images and scenarios in real time.
- AI front camera scene recognition: To offer a complete experience,



- Better color reproduction in photographs: Through the contrast of the images, Artificial Intelligence is able to highlight certain objects within the photograph and optimize them separately, allowing users to obtain professional-quality photographs.
- A more natural bokeh effect: Artificial Intelligence also helps recognize selfie scenes in order to offer a more natural bokeh effect. To do this, it optimizes photos in real time with AI technology, and can thus capture perfect portraits.
- AI Selfie Beautification: Users who have devices with AI in the camera can access professional-level lighting in their captures, thanks to the brightness level adjustment that the smartphone performs intelligently[8].

What does artificial intelligence bring to mobile devices?

He states that Cutting-edge technological developments and trends are being incorporated into different devices, and into the lives of their users, even without them being aware of it. Taking better photos or using the services of a digital assistant have become everyday actions, so that many do not notice the technology behind them. Artificial Intelligence (AI) has become one of these trends that is talked about a lot, because it is present in a large number of daily-use devices; among them, smart phones.

Until recently, AI was reserved for the most expensive, high-end devices that used the most advanced technology. But processor and component manufacturers have been concerned with bringing advanced functions to the mid-range at more affordable prices. Artificial intelligence (AI) is becoming increasingly important in everything around us. Much of the importance that this technology is gaining is caused by the rise in the use of virtual assistants. People are increasingly “trusting” these devices more and more and using them in their daily lives.

In the most recent mobile phones from major manufacturers such as Samsung, Google or Apple, the use of AI-based systems in these devices can be observed. Thanks to the advances in the components of any smartphone or tablet such as more advanced cameras, sensors and microphones, we have These devices are very handy in our daily lives. The systems that are implemented in any mobile device that allow the rear camera to see and recognize objects, classify them and even search the Internet related to these products[9].

What does a mobile device need to be smart?

The term "Smart" refers to any interface, such as a miniature QWERTY keyboard, a touch screen (the most common, called in this case "touch mobile phone")[10], or simply the mobile operating system it has, differentiating its use through an exclusive arrangement of menus, keys, shortcuts, etc.

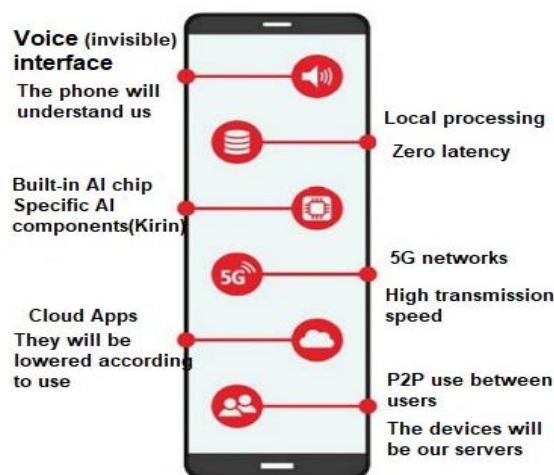
- General information: This is a device that has a color screen and combines the characteristics of a laptop and a mobile phone. It also has the ability to connect networks wirelessly and send electronic messages.
- Operating system: A smartphone has to have an operating system in order to function. The type of system used often depends on the model of the phone.
- Navigation: One of the most important aspects of how a smartphone works is the method by which navigation is carried out. Most often today, a smartphone makes use of a touch screen function in order for it to be manipulated. It is often equipped with a stylus so that information can be entered directly.
- Memory: The way in which a smartphone stores information is vital to its operation due to the large amounts of data it has to deal with. It usually has an internal memory and is supplemented by flash memory[11].

Basic characteristics of mobile intelligence

Some basic characteristics are:

- Centralized information.
- Visual location control by GPS.
- Optimization of time and costs.
- Monitoring and control in real time.
- Improvement of the productivity of the operation.
- Intuitive applications.
- Product training.

Basic Features of Mobile Intelligence



Levels of AI intelligence for mobile devices

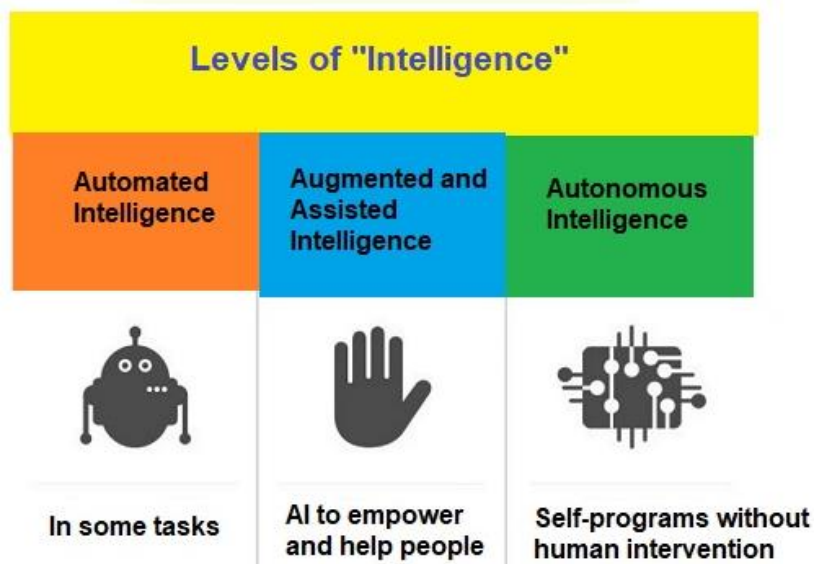


Figure (1).Levels of intelligence

- Automated intelligence. This involves automating certain low-skill or highly repetitive tasks. The idea is to free people up so they can take on tasks that require imagination or creativity, such as art.
- Augmented and assisted intelligence. As artificial intelligences move up the



evolutionary ladder, they will be able to take on certain tasks to empower us. Some are already at this level [13].

- Autonomous intelligence. At the moment, within science fiction, this AI is capable of self-programming without human intervention. It is called “no human in the loop” artificial intelligence. We do not know if we will be able to achieve it.

What is expected of AI in mobile devices?

It is possible that in the future mobile devices will be able to maintain a stable conversation similar to that of the Just A Rather Very Intelligent System. At the moment, it is confirmed that these successfully automate each activity proposed by the user.

In the coming years, it is expected that these mobile devices will be able to:

- Have an integrated system of a digital “ME”, so that it can be capable of making decisions on its own.
- An improvement in emotional recognition to determine the state of a person .
- Improved processing of the reception of the natural language of the person, thus having a fluid and understandable communication [14]. Considering that what the future of technology holds is uncertain and “in a future in which it is possible for users themselves to choose their own criteria for training AI models.”

What is the use of portable artificial intelligence in mobile devices?

Although the cloud has become one of the resources through which most smartphones, tablets and computers carry out their task, they have begun to interact independently, carrying out tasks without the need for an internet connection .

Portable Artificial Intelligence will take augmented reality far beyond Pokemon Go, as it allows for accurately mapping all the details of what surrounds the smartphone to insert 3D objects and animations into the video application of a phone or tablet. In this sense, virtual reality will look more authentic too, thanks to portable Artificial Intelligence [15].

What is the use of artificial intelligence in mobile devices?

With the constant development of technologies emphasizes that: The use of Artificial Intelligence in mobile terminals has become one of the great bets of the most powerful companies in the market, such as Huawei. Its application has become a very important evolutionary leap, and it will be much more so in the future. To know how this market segment is doing, we must know the different types of AI that exist and what it implies for smartphones. To get into context about The AI that smartphones offer is classified into three large groups, such as: Emotional Intelligence, Rational Intelligence and Neural Networks.

- Emotional Intelligence. This type of AI “has to do with the direct relationship between machines and people, and is based on the needs of the latter to achieve evolution,”.
- Rational Intelligence. For rational intelligence is: “that which gathers information, learning and use of the environment in order to obtain effective results for people. The key advance is to get the machine to be able to distinguish which is the best action to take for humans.”
- Neural Networks. mentions that: “it is one of the future options that are considered basic in Artificial Intelligence. They seek to create protocols that behave like real neurons by applying broad and complex systems of internal processes”, both at the hardware and software level[16].

Methodology



There are different types of research, in this case two were used, namely:

Exploratory Research:exploratory research “is that which captures a general perspective of the problem. This type of study helps to divide a very large problem and reaches more precise subproblems even in the way of expressing the hypotheses”[17].

Exploratory research was used to learn more about the topic that was addressed, which allowed us to familiarize ourselves with the use of artificial intelligence in different mobile devices.

Explanatory Research:explanatory research “is that which seeks the why of the facts by establishing cause-effect relationships. Its results constitute the deepest level of knowledge”[18].

This research focused on finding information on how artificial intelligence influences mobile devices, how much use is given to it, what are the characteristics, how to know if a mobile device makes use of it, among other questions as the research was developed.

Methods

These methods were used for the development of the entire research.

- Historical-logical. Used to search for various antecedents that highlight the use of artificial intelligence in mobile devices.
- Analysis – synthesis. To analyze the characteristics, importance, use, contribution and other influences of artificial intelligence, thereby determining how innovative the use of AI is in these mobile devices, as well as its importance when using it.

Empirical Methods

- Observation: allowed the identification of the qualities of the behavioral characteristic
- Diagnosis: this empirical method was used to know the results of the research.
- Bibliographic Review.

This was used in the information gathering phase of books, scientific journals, and the Internet, which contained information on the topic for the preparation of this article.

Results and discussion

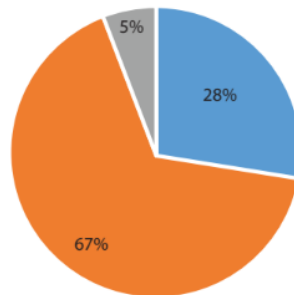


Figure (2). Do you want to use a mobile device?

Analysis: In the results we got 67% of listeners who know POCO is AI, 28% have a lot of knowledge about the topic and 5% don't know about AI.

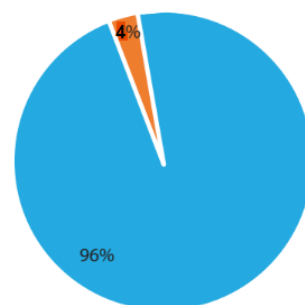


Figure (3). Do you know what is Artificial Intelligence (AI)?

Analysis: Of the total surveys, it was found that 96% have a mobile device, while 4% of



the total did not have a device.

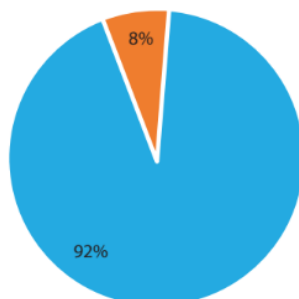


Figure (4). You realize that at the moment of using a mobile device it is being used through IA.

Analysis: With a total of 92% of people questioned, they realize that their mobile device use has used IA and 8% did not remain that way.

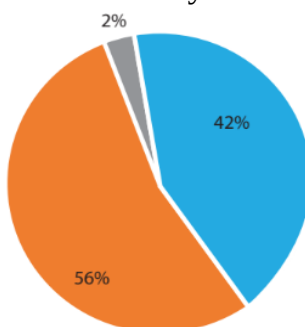


Figure (5). What do you think about the IA of your mobile device?

Analysis: The total knowledge achieved included 56% of people who consider the IA of your mobile device to be regular, followed by 42% who consider it to be good, and finally 2% who determine the IA of your device.

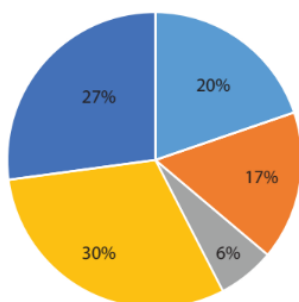


Figure (6). Which of these activities?

Are you using AI on mobile devices the most?

Analysis: A total of 30% of surveys believe that AI is most widely used on mobile devices.

Mobile devices are considered entertainment activities, followed by 27% who believe education is the activity that uses AI the most.

20% of surveys are related to businesses, 17% to homeowners, and 6% to commercial activities.

After conducting a detailed analysis of the parameters, it was found that the majority of respondents who own a mobile device and use Artificial Intelligence on their mobile devices do so primarily to carry out certain entertainment and educational activities.

Conclusions

•Through research analysis, researchers concluded that AI works most effectively when combined with large amounts of data and efficient processing using intelligent algorithms,



allowing software to automatically operate according to patterns. AI, when it comes to mobile devices, is a very useful tool because it allows for the optimization of the functions performed by these devices.

- By making them more efficient and faster, they become smart electronic devices capable of meeting user needs.
- The use of AI in mobile devices allows for improved processors, allowing applications to open more quickly. It also enables multitasking activities that add to the user experience. It achieves incredible accuracy through the use of neural networks, enabling interaction with virtual assistants via the mobile device. Some of the most popular voice assistants are Apple's Siri, Amazon's Alexa, Microsoft's Cortana, and Google Assistant.
- Voice assistants pick up user commands and conduct a search of their surroundings, providing a solution to the user's request.

AI demonstrates an immediate response to the voice assistant when using a voice assistant. Artificial intelligence (AI) is capable of adapting to various incremental learning algorithms, allowing structured data to be programmed appropriately to perform the necessary functions. It is the foundation of all machine learning and decision-making processes. AI associated with mobile devices is particularly useful in image recognition, as it can recognize up to 4,500 images per minute. Thanks to AI, devices have a real-time translator, ensuring seamless communication between the user and the device.

- Exploring new knowledge about the security aspects of AI.

References

- [1]- Turing test [Turing test | Definition & Facts | Britannica](#).
- [2]- Wang, Yong & Ji, Huan & Zhou, Yanlin & He, Zheng & Shen, Xinyu. (2024). Construction and application of artificial intelligence crowdsourcing map based on multi-track GPS data. 10.13140/RG.2.2.24419.53288.
- [3]- R. I. Mukhamediev, Y. Popova, Y. Kuchin, E. Zaitseva, A. Kalimoldayev, A. Symagulov, V. Levashenko, F. Abdoldina, V. Gopejenko, K. Yakunin, E. Muhamedijeva, and M. Yelis, "Review of artificial intelligence and machine learning technologies: Classification, restrictions, opportunities and challenges," *Mathematics*, vol. 10, no. 15, pp. 2–25, 2022.
- [4]- Pejovic V, Musolesi M (2014) Interruptme: designing intelligent prompting mechanisms for pervasive applications. In *Proceedings of the International Joint Conference on Pervasive and Ubiquitous Computing*, Seattle, WA, USA, 13–17 September, pp.~897–908.ACM, New York, USA
- [5]- T. Gaikwad, K. Khadse, S. Wailthare, and P. Dubey, "Artificial Intelligence based Chat-Bot," *International Journal for Research in Applied Science & Engineering Technology*, vol. 6, no. 4, pp. 2305–2306, 2018.
- [6]-Symantec. Apple iOS Security in the Enterprise: <http://www.oliverkarow.de/cruft/AppleIOSSecurityintheEnterpriseWP.pdf>.
- [7]- Abelson, H. *Building Mobile Applications with Android*. 2008. Retrieved from <http://people.csail.mit.edu/hal/mobile-apps-spring-08/>
- [8]- Seo S-s, Kwon A, Kang J-M, Strassner J (2011) Pyp: design and implementation of a context-aware configuration manager for smartphones. In *International Workshop on Smart Mobile Applications*
- [9]- Vilwock W, Madiraju P, Ahamed SI (2013) A system implementation of interruption management for mobile devices. In *Proceedings of the 16th International Conference on Computational Science and Engineering*, pages 181–187. IEEE
- [10]-Ernsting C, Dombrowski SU, Oedekoven M, Julie LO, Kanzler M, Kuhlmeier A, Gellert P et al (2017) Using smartphones and health apps to change and manage health behaviors: a population-based survey. *Journal of medical Internet research* 19(4):e101



- [11]- Alawnah S, Sagahyroon A (2017) Modeling of smartphones power using neural networks. EURASIP Journal on Embedded Systems 2017(1):22
- [12]- (2019) Behavdt: A behavioral decision tree learning to build user centric context-aware predictive model. Mobile Networks and Applications, pages 1–11
- [13]- He, Zheng & Shen, Xinyu & Zhou, Yanlin & Wang, Yong. (2024). Application of K-means clustering based on artificial intelligence in gene statistics of biological information engineering. 10.13140/RG.2.2.11207.47527.
- [14]- Liang, Penghao, et al. "Enhancing Security in Developes by Integrating Artificial Intelligence and MachineLearning." Journal of Theory and Practice of Engineering Science.
- [15]- Pokemon Go and AI, <https://twimlai.com/article/pokemon-go-and-ai/>.
- [16]- A.G. Howard, MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications.
- [17]- Stebbins, Robert A. Exploratory research in the social sciences. Vol. 48. Sage, 2001.
- [18]- America`s Congress, https://www.amazon.com/dp/0300093357/ref=as_at?tag=fivebooks001-20.