

A Novel Framework to Develop an Efficient Secured Optimization Model for Mobile Cloud Computing

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Article Info

Volume 9, Issue 3

Page Number : 599-609

Publication Issue

May-June-2022

Article History

Accepted : 05 June 2022

Published : 15 June 2022

ABSTRACT

Cloud computing made technological world as pay and use service. Communication technologies made human life comfortable. Mobile communication changes the world in all aspects. The combination of these give an efficient future which was proved already. Cell phone gadgets are generally utilized in our day to day routines. Be that as it may, these gadgets show restrictions, for example, short battery lifetime, restricted calculation power, little memory size and eccentric organization availability. Thusly, various arrangements have been proposed to relieve these restrictions and expand the battery lifetime with the utilization of the offloading procedure. In this paper, a novel system is proposed to offload concentrated calculation errands from the cell phone to the cloud. This structure utilizes an enhancement model to decide the offloading choice progressively founded on four primary boundaries, specifically, energy utilization, Computer processor use, execution time, and memory utilization. Likewise, another security layer is given to safeguard the moved information in the cloud from any assault. The exploratory outcomes demonstrated the way that the structure can choose a reasonable offloading choice for various kinds of versatile application errands while accomplishing huge execution improvement. Also, unique in relation to past methods, the system can safeguard application information from any danger.

Keywords : Security, Computation Offloading, Smart Phones, Mobile Cloud Computing, Particle Swarm Optimization, Privacy, Data Security.

I. INTRODUCTION

Cloud computing offers productive registering experience and computational assets. For using the help of cloud no need to introduce and keep up with the product's and different assets in the nearby

machine. Utilizing straightforward web availability any one can use the help of cloud. Furthermore of that it offers secure information facilitating, move and sharing administrations. In this manner the security of the stopped content in cloud storage is an essential and fundamental worry in cloud computing. In this

way the security of the cloud is basically solid and the confidential web access region is additionally gotten. Yet, the information transmission among two secure organizations is performed over untrusted network. Consequently a protected information move administration is expected to plan. Then again the cell phones are worked with productive ability to handle however their capacity support is seen as more modest. In this way an information facilitating administration is wanted to execute for versatile gadgets. This paper gives an outline of the condition of versatile cloud computing and their solid cloud storage methods for information the executives. Moreover, for determination of the paper, we recommend our answer alongside issue recognizable proof.

In our regular day to day existences, advanced cells are usually utilized. Notwithstanding, these gadgets have limited life range, restricted processing limit, little memory aspects and unpredictable admittance to the organization. Numerous choices were hence proposed, with the use of the release method, to lessen these restricts and broaden the battery duration. Another engineering to release extreme processing exercises from your versatile framework to the cloud is proposed in this article. This framework involves a model for enhancement to progressively assess the choice to release in light of four key boundaries: energy utilization, CPU use, runtime and capacity. Besides there is another assurance layer to get moved information from assaults in the cloud. Test That's what results showed, while accomplishing significant execution improvement, the framework would settle on the suitable downloading of the different sorts of portable applications. Furthermore, the framework will safeguard the application information against any assault, rather than past methods.

Cell phones like face identification, increased reality, picture and give a wide scope of uses, video handling,

and video gaming and discourse acknowledgment. These applications are perplexing, and the interest for it is expanding to process assets. Notwithstanding, in spite of the headways in cell phones, the degree of battery duration has stayed as one of the principal challenges in getting to the next level computational prerequisites through battery update [1]. Cloud computing [2] permits admittance to limitless asset over the web. Cloud computing gives a few benefits, like self-administration provisioning, flexibility, expansive organization access, asset pooling, low expenses, and simplicity of use, among others. In this way, portable cloud computing is acquainted with defeat the impediments of cell phone gadgets. Portable cloud registering is another worldview that coordinates cloud computing innovation and cell phones to broaden the battery lifetime and increment application execution. Late examinations have proposed to offload all or part of the versatile applications from cell phone to the cloud for far off execution [5].

These systems are intended to make a compromise between at least one imperatives, for example, energy utilization of the cell phone, CPU usage, execution time, remaining battery duration, and information transmission sum on the organization, in the offloading choice. Nonetheless, a large portion of these models don't think about memory use as an imperative in the offloading choice. Memory use is one of the principal assets consumed by versatile applications. Furthermore, security strategies are not applied in that frame of mind of offloaded information from assaults. Thusly, this work essentially centers on building another model that consolidates the vast majority of the referenced requirements to work on the exhibition of portable applications furthermore, to safeguard the application information from any assault. We explicitly proposed a clever structure that purposes calculation offloading to offload just the concentrated assignments of

portable applications. We planned an improvement model answerable for deciding the offloading choice.

II. RELATED WORK

Various methodologies have been as of late proposed to address the difficulties of cell phones by offloading the calculation errands to the cloud assets for distant execution. A portion of these methodologies move just a cycle from the cell phone to the cloned virtual machine (VM) on the cloud. In [7], a mix of static examination also, dynamic profiling modules is utilized to parcel the application and figure out which cycle is moved to the cloud.

Kosta et al. [8] made VMs of a total cell phone framework on the cloud and utilized a profiler module to screen the distant execution of the strategies utilizing an execution regulator. The fundamental disadvantage of and is the energy-consuming prerequisite of fundamental synchronization with the clone VM on the cloud. Moreover, application information are not secured from assaults during move to the cloud. In [9], the synchronization issue is taken care of by offloading just the escalated administrations and not the full cycle to the cloud. Also, the creators construct a model to decide the offloading choice for these administrations. Nonetheless, this model is very basic what's more, static and consistently favors far off execution.

In certain cases, executing administrations on the portable is better than offloading to the cloud. The moved information should be safeguarded by applying any security method. Different systems including the segment of the application and the offload of escalated strategies are proposed in [11]. These structures additionally utilize a number straight programming model like our system in pursuing offloading choices. Absolute reaction time, remaining battery life, and energy utilization imperatives are thought of in

pursuing the offloading choice without adding any memory utilization thought and security to the offloading model.

On the other hand, in [15], the full Android application is offloaded from the cell phone to the cloud, which is asset consuming attributable to the huge measure of moved information over the organization. What's more, the application shipped off the cloud should be protected, so any security procedure ought to be safeguarded. The minimization of the information transmission and the energy utilization are the fundamental objectives of, which offloads just the asset concentrated administrations and exploits from Programming as-a-Service model for the setup of escalated administrations on the cloud server.

A setting mindful portable distributed computing framework with an assessment model was worked in [7], giving a dynamic choice about where, when, and how to offload the assignments of the versatile application. Nonetheless, this system utilized a disclosure administration to acquire the equipment data of the cloud assets consistently, along these lines consuming extra energy. Likewise, the moved information were not shielded from assaults. An iterative calculation is proposed in [8], coordinating asset planning strategy and dynamic offloading to limit the energy effectiveness cost by the cell phone for finishing the application. The creators considered finish time cutoff time and errand priority as the principal imperatives in its model. This calculation contained three primary parts, in particular, calculation offloading choice, CPU clock recurrence control in nearby registering, and transmission power portion in distributed computing. Be that as it may, this structure didn't consider memory utilization [9] as an imperative in the offloading choice and apply any security method to shield the moved information from assaults. As of late, the decreases of the complete

energy utilization while fulfilling the dependability and time imperatives are investigated in [2].

The review proposed an energy-mindful dynamic assignment planning calculation, which utilized coordinated non-cyclic chart (show the undertaking priority and its correspondence cost) and basic way task way to deal with get the ideal execution request of each undertaking that limited the general energy utilization. Notwithstanding, this model zeroed in just on energy utilization metric and did not address other significant measurements, like memory utilization, Computer chip usage, and remaining battery duration, which are considered as significant measurements. Thinking about the entirety of the referenced work, different works considered memory utilization requirements in their models. In any case, no security method was applied to safeguard the offloaded information to the cloud. In this paper, we figure out a model that handles four unique limitations, specifically, memory use, execution time, CPU use, furthermore, energy utilization, in the offloading choice. This model went with the offloading choice powerfully at runtime. Moreover, we gave this structure a new security layer to safeguard the offloaded information to the cloud. The proposed structure is tried with three unique kinds of versatile applications that were created utilizing Android.

The main results and contributions of this paper are as follows:

- This work proposes a novel framework that offloads only intensive tasks instead of offloading all applications, thereby requiring less network communication.
- An optimization model is formulated to determine the offloading decision dynamically at runtime based on four main constraints, namely, execution time of the task, CPU utilization, memory usage and energy consumption.

- A new security layer is added to encrypt the data of the task before transferring to the cloud side by using AES encryption technique.
- Three different types of mobile applications are used in the experimental studies to test this framework and to show the selection of a proper offloading decision for improved application performance.

III. PROBLEM FORMULATION

Due to computational need and growing technology needs to invent new ways for data analysis and their importance in our life. Due to computer human interaction a huge amount of data daily generated some of them are essential and private and user want to secure for long time on the other hand some of the data is not much essential. In order to protect and preserve data on local machines and local storage is suspicious due to hardware faults and other physical damages thus cloud storage is required to creating backups and preserves the contents for long term. Additionally the storage of data needs security and privacy and protection from the other users and attackers thus a new secure storage and privacy preserving system is required for managing sensitive and private data with intermediate security from the attackers and malicious programs.

In order to provide the secure mobile cloud data storage services the following issues are considered.

- Mobile devices are built with efficient computing but the storage and backup is not much secure.
- Transmission of data between two secure devices is performed using public and untrusted network.
- Data in cloud is stored at random in the cloud space private and sensitive data can be mismanaged and produces the redundancy during their management.

IV. LITERATURE WORK

C. Erway, A. Kupcu, C. Papamanthou, and R. Tamassia. In versatile conveyed processing, phones can rely upon appropriated figuring and information storing resource for perform computationally thought exercises, for instance, looking, data mining, and media dealing with. Despite giving ordinary estimation organizations, compact cloud moreover improves the assignment of standard uniquely delegated framework by seeing mobile phones as organization center points, e.g., identifying organizations.

A. Fiat and M. Naor, Cloud preparing is another and promising advancement that is changing the perspective of ordinary Internet enrolling and no doubts the whole IT industry. Dispersed figuring is foreseen to stretch out in the versatile condition using on the fast advances in remote access developments. These adaptable applications are worked around compact circulated registering frameworks and models. In the Mobile Cloud condition, customers might remotely store their data similarly as acknowledge high gauge on-demand cloud applications without the hindrances of getting and keep up their own one of a kind neighbourhood hardware and programming.

G. Ateniese, R. Expends, R. Curtmola, J. Herring, L. Kissner, Z. Peterson, and D. Tune Cloud enlisting is a promising development that is changing regular Internet figuring perspective and industry of IT. With progression of remote access developments, appropriated processing is depended upon to develop to flexible circumstances, where PDAs and sensors are utilized as data gathering center points for cloud. In any case, customers' stresses over data security are the essential preventions that hinder appropriated processing from being comprehensively gotten.

J. Bethencourt, A. Sahai, and B. Waters. In this manuscript, we introduce a far reaching security system to check the data accumulating in open fogs with outstanding concentration on lightweight remote gadget store & recuperate information without revealing data substance to the cloud expert associations.

D. Boneh, X. Boyen, and E.J. Goh, Smartphone devices are commonly used in our step by step lives. Regardless, these contraptions show confinements, for instance, short battery lifetime, compelled estimation control, little memory measure and surprising framework organize. Thusly, different courses of action have been proposed to direct these confinements and expand the battery lifetime with the usage of the offloading technique. In this paper, a novel structure is proposed to offload genuine figuring endeavors from the phone to the cloud. This framework uses a streamlining model to choose the offloading decision logically subject to four central parameters, to be explicit, imperativeness use, CPU use, execution time, and memory use.

L. Cheung, J. Cooley, R. Khazan, and C. Newport Mobile gadgets (e.g., tablet, wireless, pcs, etc) are dynamically transforming into a fundamental bit of human life. These Mobile devices still need in resources diverged from a standard information taking care of contraption, for instance, PCs and workstations. The response for thrashing of these challenges is Mobile Cloud Computing. We propose another adaptable framework that enables direct use of cloud resources for increment the capacity of advantage obliged PDAs.

Mobile Cloud Computing

Mobile Cloud Computing (MCC) is combination of two terms, mobile computing and cloud computing. Mobile computing is provision of applications on mobile devices. Cloud computing refers to getting

paid services either in the form of infrastructure, platform or software through internet based cluster of distributed servers. Mobile cloud computing is provision of mobile applications using cloud to give more power to mobile devices towards computing, in spite of resource limitations in mobile devices [5].

V.PROPOSED OPTIMIZATION MODEL

In this part, we make sense of the design of the system furthermore; demonstrate the way that its modules can convey to accomplish the plan objectives of the framework. What's more, the straight enhancement model is characterized. A point by point determination of the offloading choice is likewise showed. Then, we give an calculation that explains the way this functions. At long last, we distinguish the necessary moves toward add this structure during improvement.

The system design comprises of six modules, specifically, assessor, profile, organization and data transmission screen, leader, portable chief, and cloud director. To start with, the system works at the technique level, where the engineers need to add an explanation above all concentrated strategies at the creating step. These techniques ought to require extra calculation and can be offloaded to the cloud for far off execution. These strategies should not a) rely upon the UI or b) utilize any I/O cell phone like GPS, camera, or accelerometer. From there on, at the establishment step, a parallel document containing these technique codes and its connected libraries is shipped off the cloud. This segment will be talked about later.

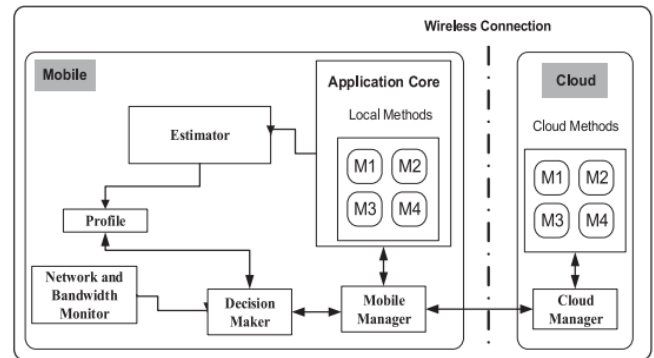


Fig. 1. Framework architecture.

Estimator: The assessor module is liable for recognizing these strategies for neighborhood execution on the cell phone also, distant execution on the cloud with various info sizes (put away as an example) at the establishment step. Then, at that point, the module acquires the upsides of execution time, memory utilization, Central processor use, and energy utilization for each clarified strategy for these different info sizes (insignificant eye application is utilized to gauge the energy utilization and Computer chip use). At last, the qualities are conveyed and shipped off the profile module.

Profile: The profile module gets the upsides of execution time, memory use, CPU use, and energy utilization from assessor module for each commented on strategy. Then, at that point, the module makes another record for every strategy what's more, stores these qualities into the document. These records are refreshed after each running cycle and utilized by the leader module as a set of experiences based record in the offloading choice.

Organization and Bandwidth Monitor: This module just screens the ongoing status of the organization and assembles cell association state and its data transmission, Wi-Fi association state and its data transmission, and sign strength of cell and Wi-Fi association (get this data utilizing programming code). Then, at that point, this data is shipped off the choice creator module to help the assurance the offloading choice.

Decision Maker: The choice make, that is to say, the centre module of the proposed system, contains a whole number direct programming model and dynamic calculation that predicts at runtime where they explained strategies are executed. The objective of the model is to find an application parcelling procedure that limits the energy utilization, move information, memory use, and CPU usage, in cell phones, dependent upon specific limitations. The chief likewise considers all information gathered from the profile furthermore, organization and data transfer capacity screen modules.

Cloud Manager: The cloud manager module is the only module deployed on the cloud side. This module is written purely in Java. Therefore, any application can benefit from the proposed framework to offload its computation to any resource that runs the Java Virtual Machine (JVM). Communication between the cloud manager and the mobile manager modules is managed by Ibis communication middleware. In the first communication, at the installation step, a binary file containing the method code and its required libraries are sent to the cloud. Then, the cloud managers receive the methods data and decrypt them in the following run. Then, the manager executes the method remotely and sends the result back to the mobile manager module with the new values to be updated by the profile module.

Algorithm 1: Framework execution flow

Input: Input size, memory usage, CPU utilization and energy consumption for each annotated method.

Output: Execution place and result for each method.

1. Read annotated methods name.
2. Check the current network status using Network & Bandwidth monitor Module.
3. if there isn't connection then
4. Execute the method locally on the mobile device.
5. else
6. for each method i do
7. Read C transfer, C memory, and CCPU and C

power through the profile module.

8. Solve the optimization model in and determine the offloading decision.
9. if the decision is offloading then
10. Encrypt the method data using AES Algorithm.
11. Send it to the cloud for remote execution.
12. Return Result back to the mobile device (communication managed using Mobile Manager & Cloud Manger Modules).
13. else
14. Execute the method locally on the mobile device.
15. end if
16. end for
17. end if
18. Update the profile file with new values.

V. RESULT & ANALYSIS

The proposed structure is assessed utilizing 3 unique sorts of versatile applications, as displayed in Table one. The trial results live four boundaries for running the machine techniques locally on a cell phone and once offloading the methodologies to the cloud by abuse the system. These boundaries incorporate span, PC equipment usage, battery utilization, and memory utilization. The investigation shows anyway these applications will enjoy the arranged system for execution improvement.

I. Experimental Setup

The trial arrangement for testing the arranged structure comprises of a Samsung Galaxy S and portable de-bad habit, a server hub, and a Wi-Fi remote organization of radio sort 802.11g. The Samsung Galaxy S and GT-I9001 runs on android stage four.4.2 with Qualcomm MSM8255T PC equipment, 512 MB memory, and electric battery capacity of 1650 mAh at 3.7 volts incorporated with a Wi-Fi interface. The server hub runs Microsoft Windows seven last 64-digit functional framework

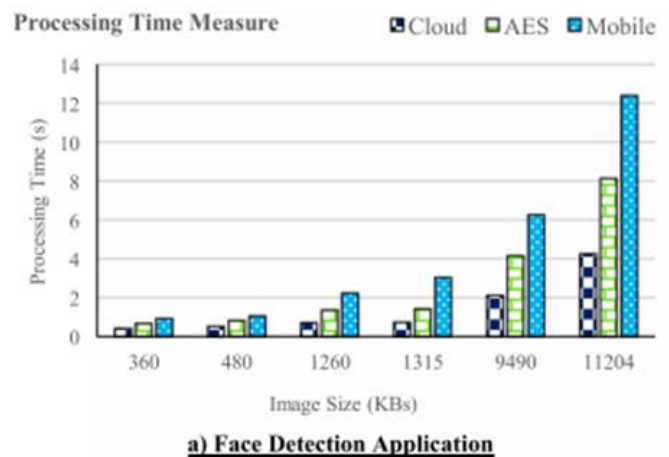
with Intel®Core(TM) i5- 2500 PC equipment with two.4Gc recurrence, four GB Smash capacity, 600 GB attractive circle, and 100 Mbps network interface[11]. The cell phone gets to the remote organization through Wi-Fi remote organization alliance of radio kind 802.11g, with the possible actual layer pace of 54 Mbps. inside the examination, very little eye V2.41 PC code is utilized to live stretch, PC equipment use, battery utilization, and memory use.

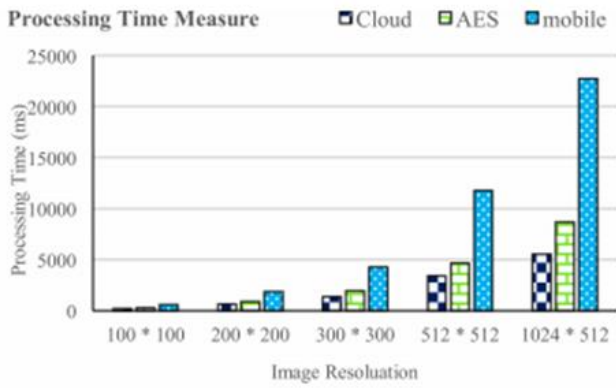
II Results Analysis

The application ways could have data as contribution for execution. Data square measure moved over the organization and hang on the cloud side assuming this procedure is offloaded for execution. Therefore, this data is defenceless to assaults. Crypto calculations are expected to ensure the security of data and correspondences Crypto calculations are delegated Circulate key calculations what are more, lopsided key calculations. Course key calculations moreover alluded to as single key, utilize an individual (shared secret) key to execute secret composition and coding strategy, though lopsided key calculations also alluded to as public key, utilize a public (shared) key to execute secret composing and uses elective individual key coding processes. The first notable symmetric calculations are DES, TDES, AES, RC6, Twofish, Blowfish, Serpent, and MARS, though RSA, DSA, PGP, SSH, and SSL square measure the notable lopsided algorithms[12].The AES calculation is picked and utilized as encryption method to safeguard the moved data of the applications. In the examination, the arranged applied math model of the system is applied to the 3 applications that pick the ideal choice for all applications. Inside the trial work, 3 totally various situations are used to demonstrate this outcome.

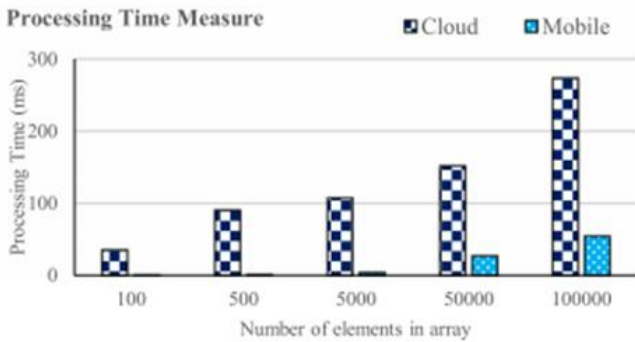
Inside the first situation, the applying ways square measure dead locally on the cell phone. Inside the subsequent situation, the applying ways square

measure offloaded for execution on the cloud by utilizing the arranged structure model while not mattering any security strategy. Inside the last situation, the applying ways are offloaded for execution on the cloud by utilizing AES equation to protect the moved data over the organization and to show the outcomes of adding this layer on the system. In the arranged system, the direct model is utilized to resolve the offloading choice and chooses an exact choice for the 3 applications once finding for the boundaries of the ways. In any case, the system is changed to allow the speedy sort application to remotely run on the cloud to demonstrate our outcome. In the exploratory work for the face recognition application, six pictures with 360, 480, 1260, 1315 KB and nine and 11 MB sizes are utilized. 5 pictures with 100×100, 200×200, 300×300, 512×512, and 1024×512 goals are utilized for the Gaussian haze application. 5 varieties of 100, 500, 5000, 50000, and 100000 sections are used in the speedy sort application. Each application is executed multiple times for each in-place, and subsequently the normal qualities square measure got.





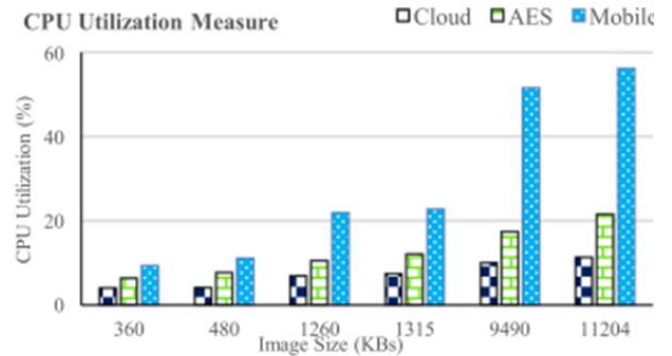
b) Gaussian Blur Application



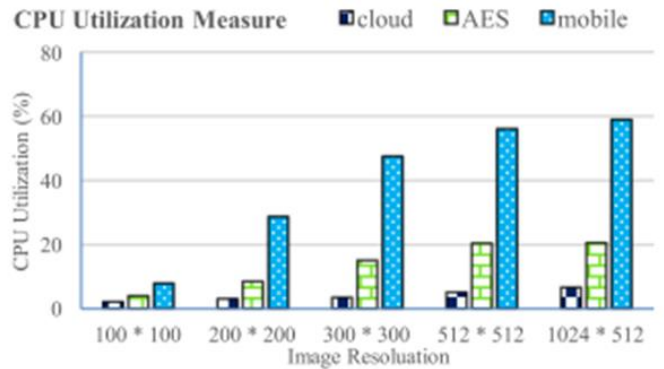
c) Quick Sort application

Fig. 2. Processing time measure for running the three applications.

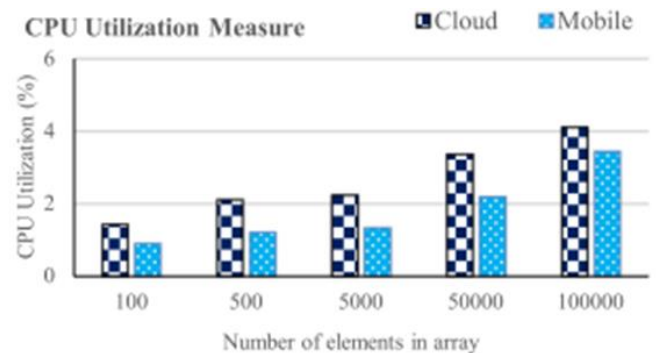
Face recognition and Gaussian haze applications square measure dead in 3 very surprising situations. The short kind application is executed involving just 2 possibilities accordingly of extra time is expected for offloading to the cloud. Subsequently, the expansion of a security layer isn't needed once a region execution choice is profitable. How much parts inside the cluster is portrayed by the direction pivot, and stretch in milliseconds is portrayed inside the direction hub. The normal stretch for executing the face identification method or mathematician obscure strategy inside the nonappearance of the arranged structure is 5-8.5 s. the normal stretch once the applications are executed utilizing the arranged system is one.5-2.5 s with none security and with respect to 3.5 s once exploitation AES as security equation for encoding the moved information to the cloud.



a) Face Detection Application



b) Gaussian Blur Application



c) Quick Sort application

Fig. 3. CPU utilization measure for running the three applications.

On the off chance that we execute the applying provincially while not abuse our system, the cell phone applications uses partner degree 30 minutes of the cycle unit |CPU|C.P.U.| focal processor| processor |mainframe |electronic gear |hardware |computer equipment on the normal (with the exception of the fast sort application because of a simple errand takes a great deal of handling for offloading than executing locally). The variety in CPU usage will increment for the applying that needs monster calculation

furthermore, little information for move. The regular memory uses for executing face discovery and mathematician obscure applications are 50 and 26 MB severally. Nonetheless, the proportions abatement to 35 and 20 MB while not security and 38 and 24 MB once utilizing AES as a security layer to shield the moved data. Hence, the projected structure will work on very half-hour of the memory use proportion for face location application and 100% for executing Gaussian Blur on the cloud.

VI. CONCLUSION

In this paper, an original got, enhanced system is master presented to work on the proficiency of offloading calculation from the cell phone to the cloud. This system can off load just the application strategies that consume significant portable assets. The offloading choice is made utilizing a formed 0-1 whole number direct programming model. This choice is made powerfully at runtime in light of four con strains, specifically, memory use, CPU usage, energy consumption, and execution time. The system likewise adds a new security layer, which utilizes an AES procedure to safeguard the strategies information prior to moving to the cloud in the off stacking case. The assessment results demonstrated that the proposed structure can further develop portable application execution by decreasing utilization in portable asset, like handling time, battery utilization, CPU use, and memory use. This concentrate additionally shows how the proposed calculation can choose appropriate offloading choices. At long last, we close that executing escalated strategies for portable applications somewhat on the cloud by utilizing the proposed structure con serves portable assets, particularly in the event that the application needs high calculation and scarcely any information to move. Later on, we need to apply a similar model on the edge registering server rather than focal distributed computing to diminish idleness. What's more, we want to empower parallelization for the

execution of the technique on the cloud to decrease execution possibly significant investment utilization.

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Cite this article as :

Mrs.Rafath Samrin, Ms. Raheem Unnisa, Ms. Saba Sultana, Ms. Tabeen Fatima, "A Novel Framework to Develop an Efficient Secured Optimization Model for Mobile Cloud Computing", *International Journal of Scientific Research in Science and Technology (IJSRST)*, Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 9 Issue 3, pp. 599-609, May-June 2022.
Journal URL : <https://ijsrst.com/IJSRST2293120>