Introduction:

Computation Offloading or Cyber foraging is a decade-old concept, which is today being widely considered for saving battery power in Compute Intensive Smartphone applications. There are many components in smartphone which are responsible for the overall battery performance. CPU, GPU, LCD screen, Wi-Fi, GPS, Camera, Various sensors, speakers etc. out of all these offloading focuses only on the CPU processing. Researchers say that with the right offloading decision the power consumed by CPU can be saved. There are huge amount of work is that is already published in this area. We need to critically examine each aspect which is involved in overall smartphone battery problem. The kind of popular applications that the modern user uses his smartphone for, does he actually require any compute intensive application which cannot be efficiently performed by advanced on chip processors like quad-core. Let us see today the smartphone user uses his smartphone for which important tasks.

Applications that may benefit from Offloading as suggested by important publications: natural language translators, speech recognizers, optical character recognizers, image processors, image search online games, video processing and editing, navigation, face recognition, augmented reality

These applications consume large mobile battery, memory, and computational resources.

This paper also compares energy consumption while offloading using both Wi-Fi and 3G architecture.

***Why Computation Offloading is a Bad Idea to save battery power on Smartphones?***

***Why Computation Offloading has a long way to go before we adopt it to save battery power?***

**Applications:** Only small set of applications might use offloading

**Mobile Idle Time:**

**Energy Expensive Components:** The Energy expensive components are display, CPU and network interface. The power consumed by just the screen and touch sensors are very high. Offloading means save the energy consumption of CPU. and if you really be saving energy means CPU compute intensive processing for prolonged time.

We conclude that due to the dynamics involved, enabling power-aware mobile offloading is extremely challenging, and involves various tradeoffs.

**Major problems in current works:**

1. To calculate the CPU intensity of a particular application, to calculate available bandwidth adds onto the total processing. These components play major role in deciding the offloading location. So this will result in extra battery drain.
2. Network Inconsistency: Most important research work in offloading Decision Engines require a consistent network performance for offloading. However, such consistency is difficult to achieve because of frequent mobile user movements and unstable network quality, hence resulting in a suboptimal offloading decision.

**Cloud Applications which have failed:**

Silk web browser, cloud gaming

**Other parameters:**Computation offloading is a complex process and it is affected by different parameters such as:

User: network data cost, cloud service cost, privacy and total process execution time determine whether a user enables/disables computation offloading. Additionally, it also depends on what actual action the user is performing- e.g. if the user is executing a performance intensive application, he would ideally want to disable computation offloading.

Smartphone: Most modern-age smartphones have powerful processors, upo 1 GB of memory and ample secondary storage, such users are less likely to require frequent mobile cloud support as compared to users with featue phones.

Application: if the data size is too large and application data is unavailable in the cloud, the mobile side computation is encouraged. coz this scenario involves higher execution time and consumes high energy in terms of communication which may negate the benefits of offloading.

***Where is Offloading successful?***

1. Image/ Video Search, Data intensive applications
2. Torrent application
3. Prolonged compute intensive apps
4. Machine Learning apps
5. Image processing apps like amazon lambda proposes, where data already exists in the cloud.

***Using Offloading for machine learning apps:***How we train model, how we build the model and how we use the model to make proper decisions. Need a figure showing machine learning parts on cloud. In this report we have used Reinforcement learning with neural network as an application driver for our study

***Experiments and Results:***

1. Machine Learning
2. Apps showing where app offloading fails
3. Apps showing where app offloading is a success
4. 3G 4G and wifi results.

***Conclusion:***

In this report we have shown how the machine learning applications in smartphones can benefit from the offloading of learning processing on cloud.

We have also shown that offloading of applications with current network conditions may not be the best bet for the app processing however certainly there are applications which can benefit from offloading for example applications requiring machine learning.

Cloud computing will certainly be useful because of its scalability, availability for data etc., but cant say it will help mobiles save power.