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Decision Making for Computation Offloading in Mobile Cloud Computing

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Background

Cloud computing simply refers to delivery of computation power using a network of remote servers. The main advantages of cloud computing [1] include on-demand computing resources, paying as per the use and simplified IT management. It comes into picture when the local processors are incapable of performing heavy tasks. Mostly, Internet is used to communicate with the cloud services. *Mobile cloud computing* extends the idea of cloud computing to handheld devices such as smartphones or tablets for increasing the computational efficiency. This is mainly achieved by handing all the resource-intensive tasks (like character recognition) of any mobile application to the remote server and then getting back the result. This is known as *computation offloading*. The remote servers comprise of powerful workstations which are much more efficient while dealing with heavy-compute tasks.

Motivation

According to a recent survey [2], 95% people in this world use cellphones and 77% people use smartphones. This directly implies that demand for interactive apps like map navigators, optical character recognizers (OCRs), voice assistants etc. is also increasing. Interactive apps like these require more resources than other conventional apps like image viewer apps, file explorers. Resources such as CPU, RAM and GPU are utilised heavily and eventually this results into battery drainage or heating up of phone. The need for stronger and efficient processors like the ones used in PCs arise. This need can be fulfilled with the help of computation offloading. A lot of research and work has been done in this field. Still, there is no perfect method which can determine exactly when the computation must be offloaded to the cloud server. As described in the next section, we see that each and every method has its own limitations like slow computations resulting into high response time, high energy consumption, improper decisions regarding when to offload, incomplete parameter considerations and more. Overcoming the shortcomings of different methods can help us achieve a better way to deal with computation offloading and optimize the user experience for interactive apps.

In India, Reliance Jio Infocomm Limited has created a vast market in smartphones by providing 4G internet services at low cost. This makes computation offloading of interactive apps more feasible. This has created a demand for better Computation Offloading methods which can handle millions of users simultaneously.

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