Augmenting mobile phone capabilites by adaptive offloading

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Nowadays, smartphones and tablet PCs are becoming increasingly popular. People use their phone not only to call, but also for a myriad of mobile applications currently available such as social and message clients, location-based services, games and many more. Although the capabilities of mobile devices are increasing, they still are resource poor compared to their desktop counterparts, and complex multimedia applications remain too slow to execute. Therefore, we present AIOLOS, a framework that will offload those complex tasks and execute them on a powerful server in the internet.

AIOLOS will run on the mobile device, and keep track of all tasks executed. When a remote server is discovered, the framework will offload the more complex tasks - that take up most processing time - to that server. However, not every task is a good candidate to offload. For example, in an image processing application, for each offloaded task the image that is processed has to be sent to the server. Depending on the network connectivity this network transfer could take more time than initially needed to execute the task locally. Therefore, AIOLOS will also keep a history of previous calls, and use this to estimate the future execution time, both local and remote. Only when remote execution is faster, the task will be offloaded to the server.

Our results on an image editor application in Android, show that when the network latency is low, AIOLOS can execute tasks almost 3 times as fast than when it is executed locally. As the latency increases, the the gain becomes lower, but in that case AIOLOS will also perform better than simply offloading all tasks, as only the ones that benefit from remote execution are offloaded.