International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 04 | Apr -2017 www.irjet.net p-ISSN: 2395-0072

SMART CACHING OF DATA OBJECTS FOR WEB BROWSERS

S.Nikitha silpiya
Department of computer application(MCA)
Anna university ,bit campus,

Dr.P.VAISHNAVI
Assistant professor
Department of computer applicaton
Anna university,bit campus

Abstract - *Battery lifetime, which is one of the most significant user experiences for mobile devices, strongly restricts the functional design of hardware architecture and applications. Among all the aspects of energy saving for mobile devices, energy-aware application design is one of the main areas that has not yet been explored comprehensively.*

In this project work, we argue for the case of energy-aware mobile application design since there is a wide gap available for energy saving on applications and we believe this is a promising area for future energy saving on mobile devices. To support energy aware mobile application design, we propose a framework called GBRT, aiming to add an energy adaptation layer by providing a set of APIs and adaptation policies.

Our proposal with two applications on Android shows that GBRT is able to save a large amount of energy by triggering applications to change the mode of applications so that the energy efficiency will be increased. Moreover our solution can reduce the webpages loading time and increase the network capacity.

Keywords: Web browser, mobile computing, wireless communication, portable devices.

1. INTRODUCTION

Smartphone is one of the most important application used for various purpose. Web browsing based on smartphones is most commonly techniques or a scheme provided by a Smartphone. There are various smart phones available in market but they used large amount of power to perform their action or at the time of web page downloading operation. Lot of research are done on power required for smartphones. And they focused on only power consumption of smartphone component like as its display, wireless interface, wifi interface which having characteristics of high power consumption. For reducing power consumption there is a need to make control on radio resources. UMTS techniques are mainly focused on such issues, it is used to control the radio resources and their timeline values at the time of releasing resources.one major advantage of our system is to reduce the latency at the time of data transmission that arrive before the timer is expire because there is still a connection is available between backbone network and smartphone. In particular, energy efficiency is defined in our scheme because mobile devices are usually charged by batteries having a limited capacity. Although energy saving for mobile device has been studied, the power consumption in bandwidth aggregation has not been defined. In our proposed system, transmissions of data are made on both WiFi and 3G interfaces in the manner of an energy efficiency. In this paper, we focused on the power consumption issue in smartphone based web browsing by using two novel techniques. In first techniques we retrieve the sequence of the

computation of the web browser at the time of loading of webpages. There are different computations during loading a webpage such as HTML parsing, execution of JavaScript code, decoding of image, style formatting, page layout, etc. These computations divide in to two categories relayed on whether they will create new data transmissions from the web server. So we want to separate these two types of computations so that the web browser can first execute the computations that will create new data transmissions and get that data. Then, the web browser can put the 3G radio interface into low power state, release the radio resource, and then run the remaining computations which take 40– 70% of the processing time for loading webpages. Thus a large amount of power and radio resource can be saved. In particular, energy efficiency is defined in our scheme because mobile devices are usually charged by batteries having a limited capacity. Although energy saving for mobile device has been studied, the power consumption in bandwidth aggregation has not been defined. In our proposed system, transmissions of data are made on both WiFi and 3G interfaces in the manner of an energy efficiency

2. LITERATURE SURVEY

1. Smart Caching for Web Browsers

In modern Web applications, style formatting and layout calculation often account for a substantial amount of local Web page processing time. In this paper, we present two novel caches, smart style caching and layout caching, for Web browsers. They cache stable style data and layout data for DOM (Document Object Model) elements, and apply directly without re-calculation when the same data is subsequently processed, possibly across different visits of a Web page. Redundant computations in both style formatting and layout calculation could be eliminated, resulting in more efficient local Web page processing. The proposed cache schemes are still applicable and effective even there are changes in the DOM structure or style rules of a Web page. For the overall performance when networking, Web servers, and local Web page processing were all included, our cache schemes could improve up to 56% when browsing these Web sites on a desktop PC and up to 60% when browsing on a netbook.

TECHNIQUE:

A novel method to improve Web browsing performance by caching intermediate results in vital stages of Web page processing and applying the cached result by construct a style cache and a layout cache to record the stable results of style formatting and layout calculation

DRAWBACKS:

- Networking is a performance bottleneck if data transmission is slower than local processing.
- It can minimize the effects of DOM modifications and localize the reflow scope, particularly when javascript code manipulates DOM elements

2. TOP: Tail Optimization Protocol For Cellular Radio Resource Allocation

In 3G cellular networks, the release of radio resources is controlled by inactivity timers. However, the timeout value itself, also known as the tail time, can last up to 15 seconds due to the necessity of trading off resource utilization efficiency for low management overhead and good stability, thus wasting considerable amount of radio resources and battery energy at user handsets. In this paper, we propose Tail

Optimization Protocol (TOP), which enables cooperation between the phone and the radio access network to eliminate the tail whenever possible. Intuitively, applications can often accurately predict a long idle time. Therefore the phone can notify the cellular network on such an imminent tail, allowing the latter to immediately release radio resources.

TECHNIQUE:

- UE-based approach (allocating the radio resources)

DRAWBACKS:

- Lack of OS support
- Radio interference level is less.

3. Mobility-Assisted Energy-Aware User Contact Detection in Mobile Social Networks

Many practical problems in mobile social networks such as routing, community detection, and social behavior analysis, rely on accurate user contact detection. The frequently used method for detecting user contact is through Bluetooth on smartphones. However, Bluetooth scans consume lots of power. Although increasing the scan duty cycle can reduce the power consumption, it also reduces the accuracy of contact detection.

TECHNIQUE:

- Mobility-Assisted User Contact detection algorithm (MAUC)
- To detect user contacts accurately. MAUC uses the accelerometer in the smartphone to detect user movement

DRAWBACKS:

Accuracy and energy saving is less.

3. PROBLEM STATEMENT

Due to the limited computation capability, when opening webpage, the current smartphone web browser takes a long time for downloading and processing all objects (e.g., java scripts) of a webpage. As a result, the data transmissions are distributed along the whole webpage downloading duration, and then the data rate at any instant time is quite low. We address the power consumption issue in smartphone based web browsing. We propose a low overhead prediction algorithm based on Gradient Boosted Regression Trees (GBRT) [10]. As our approach reduces the time to hold the data transmission resource, we can also increase the network capacity, i.e., increase the number of users supported by the network.

4. Existing system:

Due to the limited computation capability, when opening a webpage, current smartphone web browser takes a long time for downloading and processing all objects (e.g., java scripts) of the webpage. As a result, the data transmissions are distributed along the whole webpage downloading duration, and then the data rate at any instant time is quite low.

5. Proposed system:

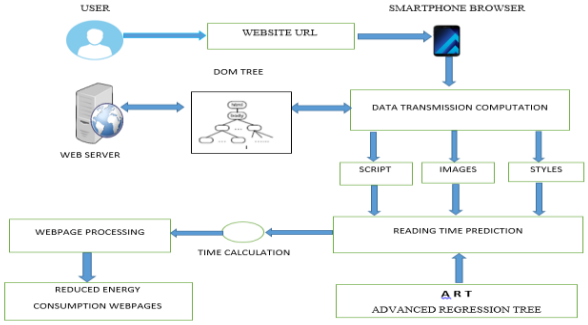
We address the power consumption issue in smartphone based web browsing through two novel techniques. First, we reorganize the computation sequence of the web browser when loading a webpage. There are various computations when loading a webpage such as HTML parsing, JavaScript code execution, image decoding, style formatting, page layout, etc. These

computations generally belong to two categories based on whether they will generate new data transmissions from the web server. So that the web browser can first run the computations that will generate new data transmissions and retrieve these data. Then, the web browser can put the wireless radio interface into low power state, release the radio resource, and then run the remaining computations which may take 40–70% of the processing time for loading webpages. Thus, a significant amount of power and radio resource can be saved

ADVANTAGES:

- Maintain both efficiency and high prediction accuracy of a system.

6. SYSTEM MODEL



7. IMPLEMENTATION

1. Data transmission computation

The current smartphone web browser, there are two types of computations associated with each incoming object. The first type is the computation that generates new data transmissions such as HTML and CSS file parsing and JavaScript code execution, which is referred to as the data transmission computation. The second type is the computation that does not cause data transmission. This type of computation is used to lay out the webpage such as image decoding, style formatting, page layout calculation and page rendering, which is referred to as the layout computation.

2. GBRT

A machine learning based approach to predict the user reading time, based on which we can decide if the smartphone should switch to IDLE. Since different users have different reading patterns, we build the prediction engine for each user individually a machine learning based approach to predict the user reading time, based on which we can decide if the smartphone should switch to IDLE. Since different users have different reading patterns, we build the prediction engine for each user individually.

3. Energy-Aware Approach

We present our energy-aware approach algorithm has two different modes: the delay driven mode which optimizes delay, and the power driven mode which optimizes power. Recall that improperly moving to the IDLE state may increase the power consumption and the data transmission delay. In delay driven mode, if the predicted reading time (T r) is shorter than T d, new data transmission may come during the FACH state, and hence the smartphone will not go to IDLE to avoid increasing the data transmission delay

Algorithm
For Optimal Prefetching
Input:
1) The list of "n" hyperlinks of the current web page.
2) Minimum support i.e. "minsup" which is used to control the number of hyperlinks to be prefetched.
3) User-specified keyword list
Output:

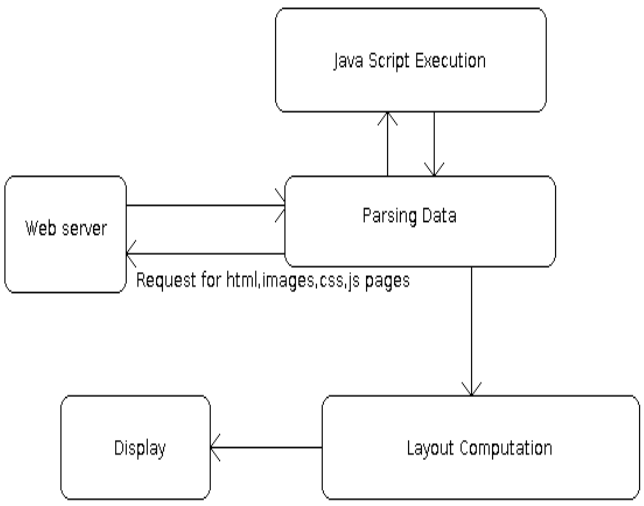
1) The optimal list of hyperlinks that are to be prefetched i.e. "L" which is large set of hyperlinks when support >= minsup Variables:
1) "n": integer which contains total number of unique keywords
2) i1, i2---------- in are set of unique keywords from list of hyperlinks
3) "k": integer
4) "termination": Boolean
5) "support [] " which contains the support value for the keywords which is calculated with the help of formula
6) "C" which contains the set of keywords that are candidate to be prefetched and C1, C2---------- Ck are the candidate keyword set which contains set of keywords of length k with their support value.
Algorithm optimal_ prefetching () {

1. Count unique individual keywords from list of hyperlinks that matches with the user-specified list by scanning all the hyperlinks once and say it as "n".
2. for j=1 to n do {Compute support [ij] =count (ij)/m by scanning all the hyperlinks once and counting the number of hyperlinks that keyword ij appears in (i.e. count (ij)).}
3. Now, create the candidate1 keyword set i.e. C1which will be the set of keywords i1, i2---------- in with their support value.
4. for j=1 to n do {Compute the L1 which contains the subset of keywords from C1 where support (ij)>=minsup.}
5. Let k=1 and termination = false
6. Repeat steps (a) to (e) until termination=true {a. Let Lk+1=empty. b. Create the candidate (k+1) keyword set i.e. Ck+1 by combining members of Lk by selecting and extending kkeyword set by one more keyword so that set of keywords will be unique and no keyword will repeat in each set. c. In addition, only consider as keywords of Ck+1 those k+1 keywords such that every subset of size k appears in Lk. d. Scan the hyperlinks once and compute the support for each member of Ck+1. If the support for a member of Ck+1>=minsup then add that member to Lk+1. e. If Lk+1 is empty then termination=true else k=k+1 }
7. Now Lk contains the list of hyperlinks that are to be prefetch
8. End. }

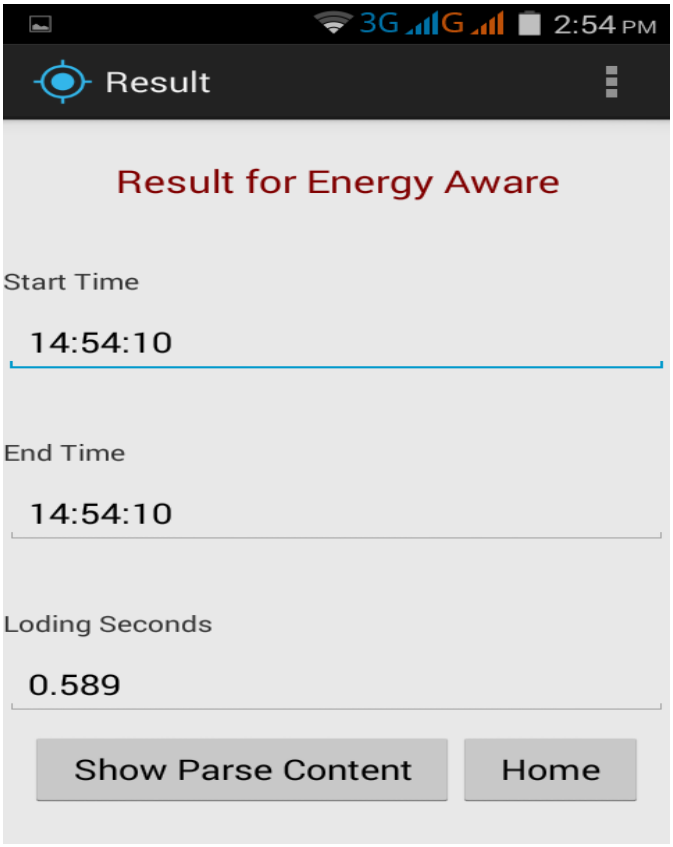
Algorithm

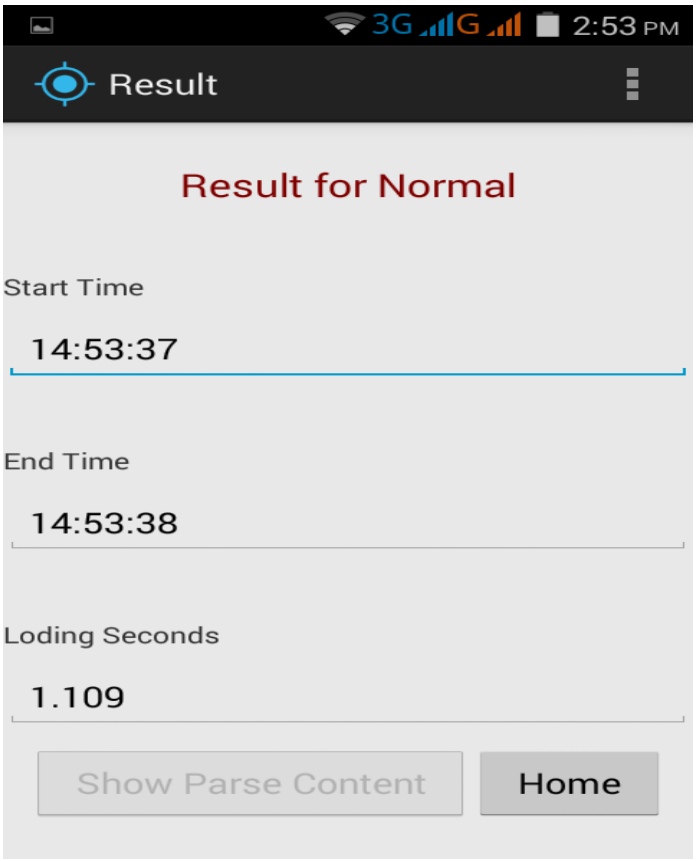
For Energy Aware Approach:

1. Start to open a webpage
2. Data transmission computation is done.
3. Layout computation is finished
4. Collect features x = {x1, • • •, x10}
5. Webpage is opened
6. Wait for α seconds.
7. Get Tr from the prediction model with x
8. if (Tr > Td) OR (Tr > Tp AND mode == power) then
9. switch to IDLE state
10. end



Screenshots:





Conclusion

In this SMART CACHING OF DATA CACHING FOR WEB BROWSERS first, we reorganize the computation sequence for loading webpage so that the web browser can first run the computations that will generate new data transmissions and retrieve these data.

Since smart-phones have limited computation capability, we propose a low overhead prediction algorithm based on gradient boosted regression trees. Additionally, our approach can also increase the network capacity, since the radio resource can be released earlier.

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