ABSTRACT

Advancement in the technology has led to the invention of modern communication devices with reduced size and enhanced capabilities. Extensive research and development in wireless technology is propelling the evolution of providing ubiquitous services to the users through portable devices. In the current scenario, users are inclining towards the exploration of exponentially growing Internet through their handheld devices. The rate of accessing the Internet through hand held devices has increased manifold in the recent years and resulted in viewing the multimedia contents through the portable devices. Online Learning and social networking websites have vastly influenced the access of multimedia content through mobile devices. This demands the adaptation of original multimedia contents suitable to the display characteristics of the user device and user preferences.

Tremendous growth of Internet has led to the availability of a wide range of contents like text, audio, video and multimodal contents containing more than one modality. These multimedia contents have been generally developed for viewing in desktops with larger display and higher processing capabilities. However when the user accesses such contents through the handheld portable devices, the multimedia content has to be modified according to the device characteristics of the user. Sometimes the user might like to view the content with only a particular modality like text or image or audio, during which the original content has to be modified according to the
user preferences. Multimedia content adaptation plays a significant role in these areas, where the original content has to be modified to dynamically obtain an adapted version, desirable to the user.

The Internet revolution and the increasing server storage capacity have led to the creation and storage of a wide variety of multimedia contents in a distributed manner. The advent of portable devices facilitates the access of such contents at any time. The required content is normally cluttered with other relevant details like advertisements, references to other contents, etc. The users are normally interested in obtaining the intended information alone due to the bandwidth constraints and time constraints. Retrieval of the most suitable content, based on the user preference enhances the user satisfaction. The above mentioned criteria can be satisfied through the presence of suitable adaptation rules.

The main objective of this thesis is to provide the user with the most desirable adapted version of the content through the analysis of various attributes like device characteristics, user preference and modality of the content being referenced. Adaptation of the multimedia content proposed in this thesis, takes into account the modalities of the requested content and the user preference along with the reduction in network traffic load through minimizing the amount of transferred content. Frequently referenced objects have been stored in the dedicated content proxy cache to achieve minimal response time for the user requests and reduce the load on the content server.
The proposed multimedia content adaptation architecture incorporates a content proxy as an intermediate between the server and the user device. The content proxy handles the request from the user and explores the possibility of retrieving the content from its local cache. If the requested content is unavailable in the local cache of the content proxy, then the content is retrieved from the content server, thereby the load on the content server is reduced.

Frequently accessed content have been stored in the cache of the content proxy using the proposed Adaptation Aware Indexing mechanism in a tree structure. The proposed indexing mechanism stores the relatively similar contents closer to each other, so that the content can be retrieved easily. The content retrieval efficiency has been increased to around 50% using the proposed indexing mechanism over the conventional methods. Along with storage, cache removal policy has been implemented to manage the available cache size at the content proxy.

Present scenario of multimedia content access through varying devices claim the need for the availability of a set of adaptation policies depending on varying parameters. The content adaptation parameters include device characteristics, user preferences, browser compatibility and bandwidth constraints. The proposed Layout Generator along with the Rule Base implemented in the system maintains a set of adaptation rules to cater varied needs of adaptation and generates suitable display layout according to the user device characteristics. The screen utilization and efficiency of the content display in the generated layout has been enhanced by 40% using the proposed layout generation algorithm.
Among the multimedia contents, the video objects are mostly larger in size. It takes a considerable amount of time to retrieve from the server and view the entire content. Existing buffer process available to view the video content retrieves the content from the server and stores it in a local buffer, so that the content can be viewed continuously once the content is fully downloaded. The proposed emotion based video summarization agent analyzes the large sized video content and generates video trailers of relatively smaller size, keeping the important information intact. This helps to reduce the size of the video content being transferred over the network and the time taken by the user to view the entire video content.

The emotionally important scenes in a video content have been determined through the peak in amplitude of the audio and facial analysis. Generation of video trailers with important scenes in the original video content reduces the amount of content transmitted over the network and the time taken by the user to infer the information from the video content. The efficiency of emotion detection through facial analysis in the proposed system is found to be around 94%.

The multimedia content adaptation process has been improved through the proposed system consisting of a dedicated proxy server implemented with cache and its associated indexing mechanism. A comprehensive adaptation of the multimedia content has been achieved through carrying out specific adaptation processes according to the modalities present in the content, which resulted in better user satisfaction.