

# **Context Aware Multimedia Content Adaptation**

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As the driving forces of technological change continue to increase exponentially as predicted by Moores' law, we have been witnessing in the last years major breakthroughs in the fields of wireless and mobile communications as well as unprecedented proliferation of multimedia enabled devices and networks. These devices can consume remote multimedia contents by connecting wirelessly through different types of access networks. However, there are problems of poor content quality and high delay/response. These problems originate from multiple varying constraints imposed by the context of usage such as contents format diversities, inadequate terminal capabilities, unreliable wireless network characteristics, diverse user preferences and unfavourable environment conditions. Current research approaches addressing these issues have not produced satisfactorily user's expected quality because they tend to address the different constraints in isolated manner. Moreover, they are focused on either adaptation at network layer or adaptation at Application/user level. Adaptation at application/user level, we believe, must be negotiated in conjunction with adaptation at network layer to achieve improvement in the quality of multimedia contents presented to users, guaranteeing efficient and fair usage of resources.

Adapting the content in a dynamic way to suit varying constraints requires that those constraints be fully characterised. In addition, the system delivering the content must be aware of different contexts (semantically or syntactically) with distinct requirements in terms of resources and thus need to be adapted in different ways. Likewise, contents have to be differently adapted according to the different conditions of the context of usage, meeting user preferences and quality expectation. Therefore, thorough characterisation of multimedia contents and their usage contexts for the purpose of developing machine learning based predictive adaptation decision algorithm, that enables adaptable quality and hitch-free multimedia content delivery is being proposed in this work as a solution. This solution will involve the design of a bi-directional decision model that integrates adaptation at application layer and at network layer through context-awareness and user preferences using machine-learning techniques. Having identified application scenarios and contextual information that characterise their applications, we look at what existing standards such as MPEG-21 DIA (Digital Item Adaptation) offer in addressing this problem. MPEG-21 standard defines a framework for the interoperable delivery and consumption of multimedia content. This framework plays a vital role in the adaptation of content supporting a variety of terminals while overcoming the limitations of the heterogeneous access networks. The tools in this framework are being studied to see how they can be integrated with machine learning, with possible modification/extension that suits our proposed solution.