Affect, Appeal, and Sentiment as Factors Influencing Interaction with Multimedia Information

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Categories and Subject Descriptors

H.3.1 [**Information Storage and Retrieval**] Content Analysis and Indexing
H.5.1 [**Information interfaces and presentation**] Multimedia Information Systems: *Evaluation/methodology*
H.5.2 [**Information interfaces and presentation**] User Interfaces: *Evaluation/methodology*

General Terms

Human Factors, Experimentation

Keywords

Multimedia information access, Evaluation of interactive information systems, Appeal based computing

Why study Affect, Appeal, and Sentiment in Information Access?

Current information access systems are primarily based on a view of users engaged in some task for which they need topically relevant information. Arguably, this is the primary use to which computing systems have been put in human intellectual activities, but investigating non-topical factors in modelling information access behaviour is likely to be of greater and greater importance for the practical construction of future generations of interactive information systems.

The primary motor in this development is the advent of practical multimedia information systems for the general public. Access to multimedia information items in some ways is much different from access to text and that consequently accessing, organising, and approaching multimedia content must be made from the perspective of the situations where it might best be useful, using target notions and success criteria that capture the use value of the sessions and items.

Multimedia information can be found of vastly varying types: information of high quality hitherto stored in comparatively inaccessible archives is being made available across the world in digitisation projects; traditional editorial and professinal multimedia production sources are making hteir materials available over the internet; multimedia information is produced by users outside the traditional professional and editorial sources.

Access to these sources is not similar to the use cases of traditional information access systems. People access multimedia not only through active choices as in a search scenario but also through lean-back interaction where the system must provide more initiative. They access multimedia not only to find topical information for some task, but to find entertainment or diversion, variously

for momentary enjoyment or a longer session, in seclusion or in a social context. An important facet of selecting what information to access is that of what others in one's social circle access: building systems to be aware of the social context and communities users participate in will allow users the satisfaction of participating even in the face of a bewildering amount of choice.

Archiving, annotating, and sharing this information appropriately needs more than topical feature extraction — the workshop discussed how to best use affective analysis of user reaction or content analysis of the multimedia material itself to provide appropriate annotations as metadata for a multimedia collection: either through automatic labeling or thorugh providing a basis for information professionals to achieve greater consistency.

Of course, there are further reasons for the study of affect, appeal, and sentiment in interaction between human and computer. If systems wish to provide more sensitive interaction mechanisms and reduce the need for explicit and verbal feedback, systems must better monitor and model the intentions and reactions of their users. This is true even in interaction situations not typically considered to be emotionally charged, such as mundane workplace tasks. Factors related to modelling the affective state of the user are likely to be of importance here.

Secondly, the notion of sentiment-aware and socially aware computer-mediated human communication systems and personal information management systems is likely to require modelling the emotive qualities of information items and discourse patterns.

Thirdly, emotional models may be useful to enhance and carry dynamic narratives, e.g. in educational applications, in interactive narration, and in gaming. The affective state of user might be useful for interaction with artwork, e.g. as a high-level model for the interaction itself over the interactive session.

And finally, to provide a better and more complete understanding of human behaviour with respect to affect in general and in interaction with computational devices specifically, a model of usage practice beyond the topic-and-task-oriented relevance model will be necessary.

Defining affect, appeal, emotion, sentiment, and attitude

There are numerous projects in this field. No consensus beyond the general vernacular usage of the most common terms can currently be assumed, but the assumptions of most projects are that

1. information items or artefacts can carry an expression of sentiment, purposely or implicitly invested into it by its creator and that this expression can be found through appropriate choice of features and appropriate content analysis of the information items in question; that
2. people are in continuously changing affective states of some sort; and that
3. activities they engage in, such as tasks or accessing information items, may have emotional impact and may be informed by the affective state of the user.

For the purposes of information access, the confluence of these factors can provisionally be called *appeal*, to be used as a target notion for information access systems, much as *relevance* is operationalised to be the target notion of topical search engines.

Many projects and research efforts variously address different aspects of these three facets of affect, appeal and emotion. But comparatively few research projects *link* the study of affective state of the user both with an understanding of the activities they are pursuing and with the study of sentiment expressed in information. This is a crucial gap, essential to bridge for future research efforts.

Representation of affective states

There are two major approaches are used to model human affective states or emotions:

1. categorial models where emotions are listed in a palette of salient and recognisable basic emotions as in the "Big 6" or "Big 18" list of emotions, based most notably on work by Paul Ekman and

2. dimensional representations where emotions are assessed along dimensions such as "Pleasure", "Arousal", and "Dominance", based on work by Albert Mehrabian.

Categorial models are typically used in studies where the objective is to recognise one of a set of emotions for some purpose, or to test the efficiency of some analysis algorithm. However, most projects or studies which apply models of human emotion or affective state to some task use variants of dimensional models.

Palette models have the immediate advantage of being of an acceptable and transparent level of abstraction, with convenient labels for commonly accepted emotions; these emotions, however, are not necessarily optimal for application in interactive models: the inventory of emotions in the palettes in question are defined to be those which can reliably be identified in still images of facial expressions which yields a palette of emotions, and are less well tailored towards the needs of understanding e.g. information access.

In dimensional models the dimensions used appear typically not to be independent of each other, but trace patterns or shapes across the representational space, where applications are assumed to be able to relate a position in the representational space to some understanding of task utility. Following or modelling such trajectories over the course of e.g. a movie clip over time appears to be a promising future avenue of study for understanding the affective impact of individual information items.

Ground truth

A major need for projects in this general area is to define some agreed upon test cases, providing ground truth for evaluation of analysis schemes, a crucial step for developing applications from laboratory innovation. Some projects make use of self-reporting schemes through interviews, questionnaires, or direct feedback mechanisms; other projects measure physiological reactions or brain scans of users in various situations. In most cases this is done using cumbersome and inconvenient measuring apparatus: finding unobtrusive and non-invasive methods for assessing affective states of users and of sharing resources in some way would seem to be an important task for future test case collection efforts.

Impact of information items

Given more information about information items, typical information system tasks such as information retrieval, document categorisation, document recommendation, and computer mediated communication can all, in theory, be improved through a more fine-grained understanding of the potential emotional impact of its content. This is what might constitute an appeal-based search engine, to complement the relevance-based engines in use today. However, the practical question of how to turn these plausible hypotheses into useful and worthwhile systems is in need of a *use case analysis*, to establish how users might be able to leverage information about potential emotional impact of information items and emotional engagement they require of their users into more useful and effective information access. In some cases, the benefit might be obvious, if such analyses could be turned into a reliable preference prediction mechanism, or in matching moods across media to achieve cross-media synergies.

Public and social media

The importance and the underutilisation of *public media* as a communication and information channel is notable: focussing on the private and individual usage scenarios risks missing an entire

arena of communication shared across large collectives of people. Current research in *social media* extend the individual models, but have not reached to model the public arena.

Future directions

Bringing together the most central research questions of content analysis of media, observation of human behaviour, linking the two through an appropriate representation, understanding the potential use cases of affect, appeal and emotion in interaction, establishing the defining characteristics of appeal as a target notion, modelling social and public use and reuse of information items, and bringing them all together in a usefully engineered framework is a grand challenge for the next steps of information access research!

Acknowledgments

This paper is based on discussions held at a workshop on *Affect, Appeal, and Sentiment as Factors Influencing Interaction with Multimedia Information*, held on May 28, 2009, in Brussels, organised by the CHORUS project and the European Commission.