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Transactions on Intelligent Systems and Technology

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Survey Papers Published in ACM TIST

Featured Articles

Extracting City Traffic Events from Social Streams (published in Vol. 6, No.4)
Pramod Anantharam[(1)], Payam Barnaghi[(2)], Krishnaprasad Thirunarayan[(3)], Amit Sheth[(1)]
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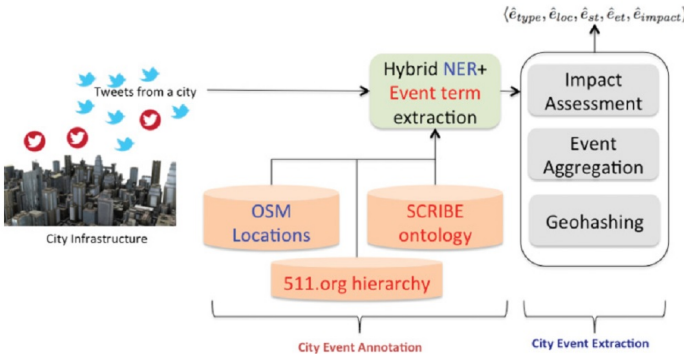

Cities are composed of complex systems with physical, cyber, and social components. Current works on extracting and understanding city events mainly rely on technology-enabled infrastructure to observe and record events. In this work, we propose an approach to leverage citizen observations of various city systems and services, such as traffic, public transport, water supply, weather, sewage, and public safety, as a source of city events. We investigate the feasibility of using such textual streams for extracting city events from annotated text. We formalize the problem of annotating social streams such as microblogs as a sequence labeling problem. We

present a novel training data creation process for training sequence labeling models. Our automatic training data creation process utilizes instance-level domain knowledge (e.g., locations in a city, possible event terms). We compare this automated annotation process to a state-of-the-art tool that needs manually created training data and show that it has comparable performance in annotation tasks. An aggregation algorithm is then presented for event extraction from annotated text. We carry out a comprehensive evaluation of the event annotation and event extraction on a real-world dataset consisting of event reports and tweets collected over 4 months from the San Francisco Bay Area. The evaluation results are promising and provide insights into the utility of social stream for extracting city events. (Read more)

User-Specific Feature-Based Similarity Models for Top-n Recommendation of New Items (published in Vol. 6, No.3)

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Recommending new items for suitable users is an important yet challenging problem due to the lack of preference history for the new items. Noncollaborative user modeling techniques that rely on the item features can be used to recommend new items. However, they only use the past preferences of each user to provide recommendations for that user. They do not utilize information from the past preferences of other users, which can potentially be ignoring useful information. More recent factor models transfer knowledge across users using their preference information in order to provide more accurate recommendations. These methods learn a low-rank approximation for the preference matrix, which can lead to loss of information. Moreover, they might not be able to learn useful patterns given very sparse datasets. In this work, we present UFSM, a method for top-n recommendation of new items given binary user preferences. UFSM learns **U**ser-specific **F**eature-based item-**S**imilarity **M**odels, and its strength lies in combining two points: (1) exploiting preference information across all users to learn multiple global item similarity functions and (2) learning user-specific weights that determine the contribution of each global similarity function in generating recommendations for each user. UFSM can be considered as a sparse high-dimensional factor model where the previous preferences of each user are incorporated within his or her latent representation. This way, UFSM combines the merits of item similarity models that capture local relations among items and factor models that learn global preference patterns. A comprehensive set of experiments was conduced to compare UFSM against state-of-the-art collaborative factor models and noncollaborative user modeling techniques. Results show that UFSM outperforms other techniques in terms of recommendation quality. UFSM manages to yield better recommendations even with very sparse datasets. Results also show that UFSM can efficiently handle high-dimensional as well as low-dimensional item feature spaces. (Read more)

Pattern Matching Techniques for Replacing Missing Sections of Audio Streamed across Wireless Networks (published in Vol. 6, No.2)

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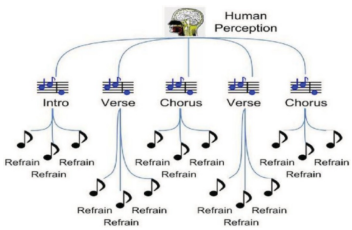

Streaming media on the Internet can be unreliable. Services such as audio-on-demand drastically increase the loads on networks; therefore, new, robust, and highly efficient coding algorithms are necessary. One method overlooked to date, which can work alongside existing audio compression schemes, is that which takes into account the semantics and natural repetition of music. Similarity detection within polyphonic audio has presented problematic challenges within the field of music information retrieval. One approach to deal with bursty errors is to use self-similarity to replace missing segments. Many existing systems exist based on packet loss and replacement on a network level, but none attempt repairs of large dropouts of 5 seconds or more. Music exhibits standard structures that can be used as a forward error correction (FEC) mechanism. FEC is an area that addresses the issue of packet loss with the onus of repair placed as much as possible on the listener's device. We have developed a server--client-based framework (SoFI) for automatic detection and replacement of large packet losses on wireless networks when receiving time-dependent streamed audio. Whenever dropouts occur, SoFI swaps audio presented to the listener between a live stream and previous sections of the audio stored locally. Objective and subjective evaluations of SoFI where subjects were presented with other simulated approaches to audio repair together with simulations of replacements including varying lengths of time in the repair give positive results. (Read more)

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