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Intelligent Radio Search

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ABSTRACT

Radio search using traditional techniques such as tuning or switching between pre-stored radio stations is cumbersome and time-consuming. It is difficult for users to locate a radio station that is currently playing programs that are of interest to them. The techniques described in this disclosure employ voice recognition, audio fingerprinting, and on-the-fly recognition to identify available content. Further, the available content is matched with known user preferences, based on user consent. An intelligent, assistive user interface based on matched radio content is provided to the user. The interface enables the user to easily find and listen to radio content of interest.

KEYWORDS

Radio; radio UI; smart radio; car entertainment; assistive user interface

BACKGROUND

Conventional radio UI, e.g., tuning or switching between pre-stored radio stations, can be cumbersome and time-consuming. To find content of interest, e.g., music of a certain genre, a user needs to keep switching stations till such content is found. Further, a user needs to memorize show timings and stations, e.g., for favorite radio shows. Such a UI also does not enable the user to search for currently available radio content that include particular content, e.g., particular news headlines. To discover news about a particular topic, a user needs to keep switching stations till such a radio station is identified. Current radio devices, such as home receivers and car radio permits users to switch between available stations.

DESCRIPTION

Current radio interfaces that require tuning or scrolling between pre-set stations by frequency make little sense in a world where intelligent techniques and systems that can leverage content recognition are available. Content recognition can help summarize news, identify songs and proprietary content, etc. This disclosure describes the use of such techniques to provide a radio user experience and user interface.
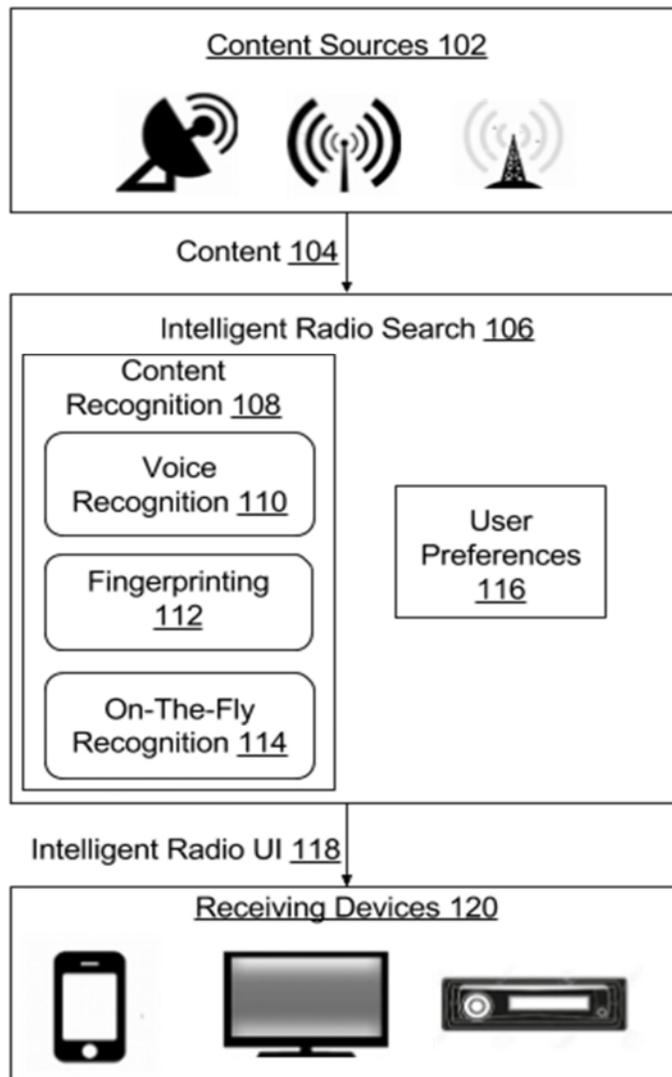

Fig. 1: Intelligent Radio Search

This disclosure describes intelligent radio search module (106), implemented using computing hardware and software. The intelligent radio search module analyzes radio content transmitted from multiple sources (102) to recognize and extract content (104). The extracted content is used to provide an enhanced user experience for radio, in the car, on the mobile phone (120) or in any other setting where a user listens to radio content in real-time. Content analysis is performed by passing the raw audio waveform of a radio signal through intelligent systems that can recognize the content. Such systems can utilize machine learning to identify content in transmitted media. Content recognition can also be accomplished using, for example, voice recognition (110), audio fingerprinting (112), and/or on-the-fly recognition (114) techniques. Content recognition module (108) uses a combination of these approaches to identify content.

Content recognition techniques such as audio fingerprinting are employed to quickly identify transmitted radio content that is likely to be of interest to the user, e.g., a popular or favorite song. Voice recognition is used to transcribe a media stream to text. For instance, in the case of radio news programs, voice recognition is used to index radio streams by their textual content. On-the-fly recognition is used, for example, to perform on the fly content translation from the transmitted language into a user-preferred language.

The identified content is presented based on user-preferences (116). For example, consider a user Alice. When the user Alice permits use of her current location, the techniques described herein can identify a particular radio station A that is currently transmitting traffic updates. Upon identifying such a radio station, an assistive user interface is provided to Alice, e.g., a voice prompt or displayed UI that provides a message such as "Hi Alice, radio station A has traffic updates in your area, would you like to switch to radio station A?" In another example, e.g., when the user Alice permits use of preference information, the techniques

described can determine that a radio station B is currently playing songs by an artist P that is indicated as a favorite in the preference information. In this example, the assistive UI can automatically switch to the radio station B, e.g., if the user enables automatic switching, or can provide a prompt such as "Hey Alice, radio station B is playing your favorite artist, change to station B?" In yet another example, the techniques enable the user to indicate a particular preference, e.g., that the user prefers to listen to news about current world affairs news at particular times, and a helpful message such as "Hi Alice, radio station C has the latest on happenings in Germany" is provided. Intelligent radio search can provide a user interface with multiple available selections that a user can select from, e.g., "Station A is playing classic rock," "Station B has weather updates," "Station C is airing an interview with the President," etc. When a user permits access to user preferences, the selections are personalized for the user.

Content filters can also be employed to enable radio UI that permits a user to scroll through radio streams that match particular criteria such as content type (live news, music, weather reports, local news). Based on user permissions for use of such data, the particular criteria can also include a location, a current time, etc. Alternatively, raw search term monitoring can be used to listen for a particular headline or related content and automatically tune into the corresponding radio stream when such content is detected.

In this manner, the techniques of this disclosure provide an intelligent, assistive user interface (118) for radio. The UI includes, for example, terms that summarize the content of available radio streams. Further, an option is provided to automatically translate available radio content into a target language preferred by the user. For example, in Switzerland, where radio channels are available in four different languages, a user can benefit from content streamed in any of those languages by using such a translation option.

If a user permits access to user activity data, the intelligent radio search can also include a recommendation mechanism that takes into account previous user patterns. Upon user content, user preferences are learned based on the user's past tuning or selection behavior, e.g., the type of radio channels the user typically listens to and the type of channels that are skipped. The radio search can also account for additional context, e.g., weather at the user's location, traffic conditions at the user's location (e.g., if it is detected that the user is in a vehicle), etc.

The described techniques enable intelligent, assistive radio search user experiences that are not available in conventional radios. A combination of content recognition techniques is used along with content recommendation mechanisms to provide a content and context-aware radio search user interface.

In situations in which certain implementations discussed herein may collect or use personal information about users (e.g., user data, information about a user's social network, user's location and time at the location, user's biometric information, user's activities and demographic information), users are provided with one or more opportunities to control whether information is collected, whether the personal information is stored, whether the personal information is used, and how the information is collected about the user, stored and used. That is, the techniques discussed herein collect, store and/or use user personal information specifically upon receiving explicit authorization from the relevant users to do so.

For example, a user is provided with control over whether programs or features collect user information about that particular user or other users relevant to the program or feature. Each user for which personal information is to be collected is presented with one or more options to allow control over the information collection relevant to that user, to provide permission or authorization as to whether the information is collected and as to which portions of the

information are to be collected. For example, users can be provided with one or more such control options over a communication network. In addition, certain data may be treated in one or more ways before it is stored or used so that personally identifiable information is removed. As one example, a user's identity may be treated so that no personally identifiable information can be determined. As another example, a user's geographic location may be generalized to a larger region so that the user's particular location cannot be determined.

CONCLUSION

This disclosure describes an assistive, intelligent radio search interface. Content recognition techniques are utilized to identify radio content available to a user. Based on user preference data that a user has provided consent for, radio stations that are playing content likely of interest to the user are determined. The user interface provides information to a user about current programs that are likely to be of interest, and permit the user to directly switch to a radio station of interest.