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(54) **APPARATUS AND METHOD OF SEARCHING FOR DESIRED TELEVISION CONTENT**

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G06F 3/00 (2006.01)
G06F 13/00 (2006.01)
H04N 5/445 (2006.01)

(52) **U.S. Cl.** **725/53**; 725/137; 725/142

(58) **Field of Classification Search** 725/52, 725/53, 55, 134, 142, 46, 47, 137; 707/3, 707/6–7, 10, 104.1, 4; 348/461, 468; 704/200, 704/275

See application file for complete search history.

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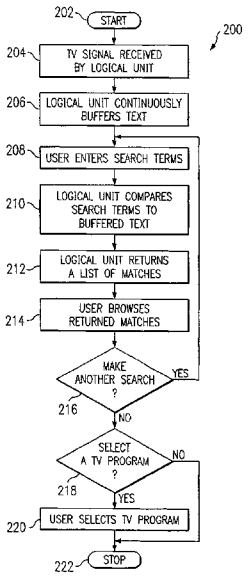
(57) **ABSTRACT**

The present invention is an apparatus and method for allowing a user to search for specific content across many television channels in order to locate desirable television shows related to the searched content. Multiplexed cable signals flow thorough a logical unit which buffers text associated with the voice stream of each station via the pre-encoded closed-captioning signal or through the real-time voice translation within the logical unit. The user then enters search terms through one of a variety of different input devices. Upon entry of the search terms, the logical unit will compare the entered term with those available keywords stored in each buffer. Lexical parsing associates terms which may differ from plural to singular forms, or in tense. Additionally, synonym comparisons may be made. The logical unit will return a list of matches for the search criteria and allows the user the option of going directly to the television program. The logical unit also evaluates each returned item for its relevancy to the keywords. When not in use, the logical unit maintains a quiescent but monitoring state permitting continuous creation of lexical buffers. This permits the user who turns the television on to immediately have such search terms available. Alternatively, the logic is implemented at the cable provider and enabled through interactive links to the home. In that case, the home logical unit is unnecessary.

10 Claims, 2 Drawing Sheets



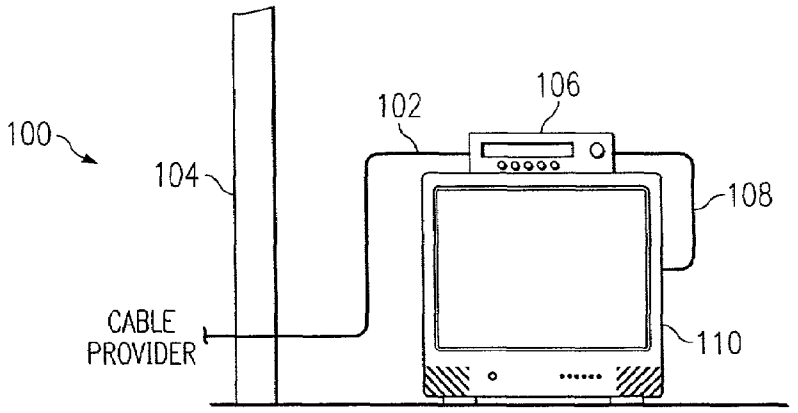

100
104
102
106
108
110
CABLE PROVIDER

FIG. 1

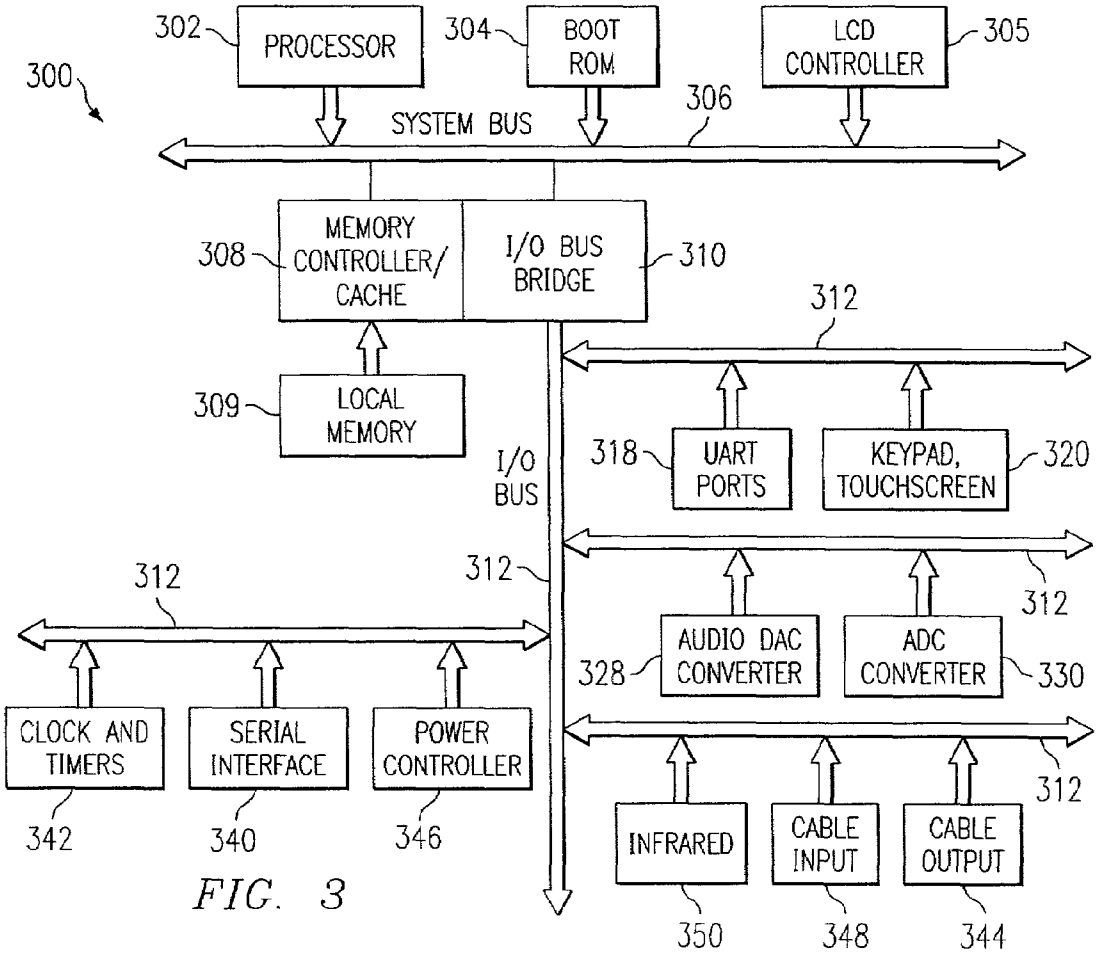
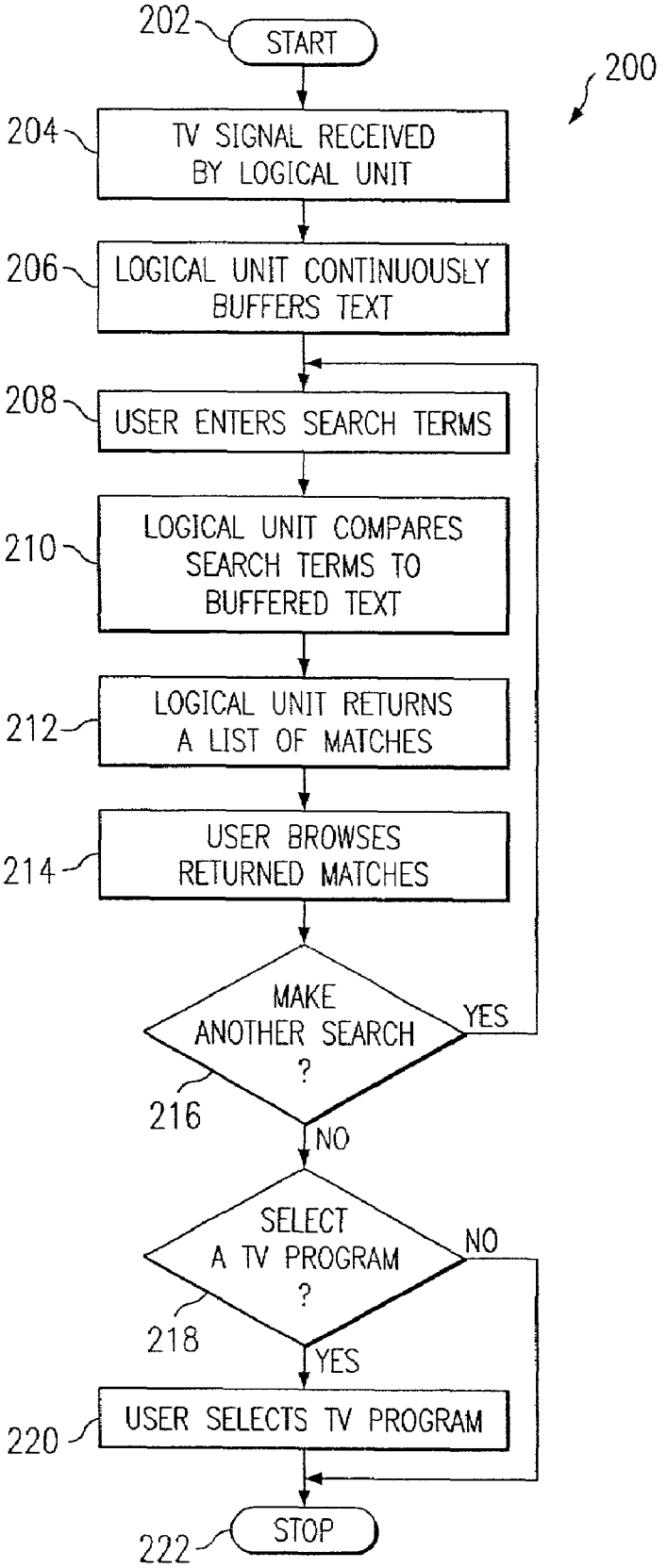

300
302
PROCESSOR
304
BOOT ROM
LCD CONTROLLER
305
306
SYSTEM BUS
308
MEMORY CONTROLLER/ CACHE
I/O BUS BRIDGE
310
312
309
LOCAL MEMORY
I/O BUS
318
UART PORTS
KEYPAD, TOUCHSCREEN
320
312
312
312
AUDIO DAC CONVERTER
328
ADC CONVERTER
330
CLOCK AND TIMERS
SERIAL INTERFACE
POWER CONTROLLER
342
340
346
312
INFRARED
CABLE INPUT
CABLE OUTPUT
350
348
344

FIG. 3

FIG. 2


202
START
200
204
TV SIGNAL RECEIVED BY LOGICAL UNIT
206
LOGICAL UNIT CONTINUOUSLY BUFFERS TEXT
208
USER ENTERS SEARCH TERMS
210
LOGICAL UNIT COMPARES SEARCH TERMS TO BUFFERED TEXT
212
LOGICAL UNIT RETURNS A LIST OF MATCHES
214
USER BROWSES RETURNED MATCHES
MAKE ANOTHER SEARCH ?
YES
216
NO
SELECT A TV PROGRAM ?
NO
218
YES
220
USER SELECTS TV PROGRAM
222
STOP

APPARATUS AND METHOD OF SEARCHING FOR DESIRED TELEVISION CONTENT

FIELD OF THE INVENTION

The invention relates to an apparatus and method of searching television programming for specific content.

BACKGROUND OF THE INVENTION

Television is one of the most popular communication mediums today. In fact, television has become so popular that more information is being broadcast every day than is possible for any one person to assimilate. Therefore, television viewers frequently desire to search out television programs that are related to a specific topic of interest. For example, a viewer may want to locate television programs related to a particular animal such as a bear, a particular country such as India, or a particular government agency such as the police. However, locating specific television programs which pertain to a desired topic is difficult and time consuming. It is virtually impossible to quickly locate a specific topic across hundreds of television stations broadcasting thousands of different types of shows by scanning through the various television channels. Therefore, a need exists for an apparatus and method for searching through the multitude of television channels and the multitude of programming on those channels by which a viewer could enter specific keyword terms into a search engine and then view a list of programming related to the entered terms that would be provided by search engine.

Similarly, the Internet is a very popular medium for communication of information. As it is impossible for anybody to obtain all of the information on the Internet, search engines have proved invaluable in allowing users to access specific information on the Internet. Since many television viewers are familiar with the Internet and Internet search engines, there exists a need for an apparatus and method for searching through television programming similar to the method that search engines use for searching through the Internet.

Such technology is known in the art. U.S. Pat. No. 5,481,296 issued on Jan. 2, 1996 discloses an "Apparatus and Method for Selectively Viewing Video Information." However, the '296 patent does not disclose an improved method for searching for keywords within the closed captioning text. Additionally, the '296 patent does not disclose a method for searching for synonyms of the desired keywords. Furthermore, while the '296 patent discloses a method for searching for keywords in video signals, the '296 patent does not disclose a method of evaluating the effectiveness of the returned search items.

Therefore, a need exists for an apparatus and method for searching television programming which will enable the user to enter keywords and view a list of programming which is related to the keywords. A need also exists for an apparatus and method which is capable of searching for synonyms of the keywords. Finally, a need exists for an apparatus and method which will evaluate the returned search items and inform the user as to the relevancy of each returned item.

SUMMARY OF THE INVENTION

The present invention, which meets the needs stated above, is an apparatus and method for allowing a user to search for specific content across many television channels in order to locate desirable television shows related to the searched content. This television viewing mechanism is based upon real-time network television broadcasting of shows in progress which provide audio captioning, as opposed to cable provider television folders, movie indexed shows, guides, or live audio feeds. By creating buffers containing lexical search terms, dynamic search capabilities can be provided which represent an improvement over existing technology. In the preferred embodiment, the fundamental logical manipulations occur at the user's location either in the tuning unit within the television or in a set-top box (the logical unit). These multiplexed cable signals flow thorough the logical unit which buffers text associated with the voice stream of each station. This can be done via the pre-encoded closed-captioning signal or through the real-time voice translation (e.g. through Via Voice or other well-known technologies) within the logical unit. The user then enters search terms through one of a variety of different input devices. In cases where viewers are unable to determine exact spelling or phraseology content, keyword masking or wildcards can be included in the search criteria. For example, if the user is interested in finding television shows about the mating habits of bears, the user could enter into the search screen "bear* mat*" and be able to find the singular forms of a "bear" and the "mate" or "mating" habits of the species. This is accomplished by utilizing lexical parsing engines that scan television captioning text on all cable channels in order to locate the searched keywords and inform the user that the television channels are currently discussing content relative to the specific search.

Upon entry of the search terms, the logical unit will compare the entered term with those available keywords stored in each buffer. Lexical parsing associates terms which may differ from plural to singular forms, or in tense. Additionally, synonym comparisons may be made. The logical unit will return a list of matches for the search criteria and allow the user the option of going directly to the television program. The logical unit also evaluates each returned item for its relevancy to the keywords. When not in use, the logical unit maintains a quiescent but monitoring state permitting continuous creation of lexical buffers. The continuous creation of lexical buffers permits the user who turns the television on to immediately have such search terms available. Alternatively, the logic is implemented at the cable provider and enabled through interactive links to the home. In that case, the home logical unit is unnecessary.

The present invention makes it easier to search cable television for the desired content. Instead of relying on static identifiers, the innovation allows dynamic and therefore more thorough and exhaustive searches to take place.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of the invention interacting with a cable provider and a television set.

FIG. **2** is a flowchart of the logic of the present invention.

FIG. **3** is a depiction of the data processing system contained within the logical unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The term "multiplex" as used herein means the process of funneling several different streams of data over a common communications line. The term "cable provider" as used herein means a company which provides television service to multiple users and includes satellite television services. The term "lexical parsing" as used herein means a process of finding matches to a desired search term by comparing the desired search term letter-by-letter with the terms in an available database.

FIG. **1** is an illustration of the invention **100** interacting with a cable provider and a television set. The cable provider (not shown) provides a television signal through a coaxial cable **102** that runs through the user's wall **104** and into the logical unit **106**. Logical unit **106** buffers the cable signal as described below and displays the information on television **110** via television connection **108**. Alternatively, logical unit **106** may be placed at the same location as the cable provider such that it is unnecessary to have logical unit **106** at the user's location.

FIG. **2** is a flowchart of the logic contained within logical unit **106** of the present invention. Search program **200** starts (**202**) and logical unit **106** receives the cable signal transmitted by the cable provider (**204**). The cable signal is multiplexed and comprises at least a visual signal, an audio signal, and a closed caption text signal. Moreover, the multiplexed cable signal is not limited to real-time cable programming. The multiplexed signal may also contain information regarding past and future television programs. As logical unit **106** receives the signal, search program **200** continuously buffers the transmitted multiplexed cable signal (**206**). In buffering the signal, search program **200** obtains the closed-caption text from the cable signal and store the words contained in the captioning text along with the television channel number and time of the television program. Alternatively, search program **200** can buffer the television signal by analyzing the audio signal and buffering the keywords from the audio signal. The text buffering described above is known in the art. Furthermore, the buffering process is not limited to one television channel or one specific time period. If a user desires to buffer different channels at different times, then the user may do so by means of search program **200**. For example, if search program **200** has ten hours of buffering time available, the user can have search program **200** buffer ten hours of a channel such as Cable Network News (CNN). Alternatively, search program **200** can buffer four hours of CBS, four hours of CNN, and two hours of the weather channel. Furthermore, the buffering times do not have to be similar. The user can define the CBS buffering time from 5 am to 9 am, the CNN buffering time from 8am to noon, and the weather channel from 1 pm to 3 pm. The buffering can occur when the television set is not activated. Additionally, search program **290** is not limited to the English language. Search program **200** is capable of buffering television in multiple languages simultaneously. Thus, at any given time search program **200** is capable of buffering an enormous variety of television programs.

The user then enters keyword terms that represent the search criteria for search program **200** (**208**). The search terms can be entered via a keyboard, stylus, infrared port, or on-screen programming. In entering the search terms, search program **200** will recognize conventional Boolean search terms such as "AND", "OR", and "NOT". Search program **200** is capable of accepting wildcard search terms. For example, the wildcard search term "run*" would search for run and all possible variations such as runner, running, runners, and so on. Search program **200** also compares each of the search terms to a dictionary database. If any of the search terms are not in the dictionary database, search program **200** will determine related words using lexical parsing and query the user if the terms are relevant to the desired search. Lexical parsing solves the problem of tense variation in the search terms. Search program **200** is also capable of resolving ambiguities in entered search terms by comparing the search terms to the dictionary database. Those skilled in the art are aware of how to configure a search program to resolve ambiguities. In alternative embodiments, the query step can be removed where search program **200** automatically adds the lexically parsed words to the list of search terms. Additionally, the search criteria can comprise a date restriction (i.e. only today's programs, only programs on this week, or only programs on Tuesdays). Furthermore, the search criteria can comprise restrictions based on specific channels (i.e. only programs on ESPN, DISCOVERY, CNN, or VH1, or alternatively, only programs on channels 8, 12, 25, 45, or 54).

Search program **200** then compares the search terms to the buffered text (**210**). Search program **200** will compare the search terms to the terms contained within the buffer. In comparing the search terms with the buffered programs, search program **200** will also create a list of synonym search terms. By accessing a thesaurus database, search program **200** can obtain relevant synonyms and use those terms to search the buffered text as well. When the search term matches a word in the buffered text, search program **200** will mark the program and continue to search through the rest of the buffered text. When the entire buffered text has been searched, search program **200** evaluates the relevancy of each flagged item. In evaluating the relevancy of each flagged item, search program **200** looks to the original search terms, the synonyms search terms, the lexically parsed search terms, and the date, time and channel specified by the user. Search program **200** then ranks the flagged items from most relevant to least relevant.

Search program **200** then displays the list of television programs which were previously marked in step **210** (**212**). Search program **200** will organize the results of the search according to how well they correspond to the entered search criteria. The results of the search are displayed with the time and television channel pertaining to the television program. The user then browses the television programs returned in step **212** (**214**) and makes a determination whether they would like to conduct another search (**216**). If the user does want to conduct another search, search program **200** returns to step **208**. If the user does not want to conduct another search, the user makes a determination whether they would like to select a television program (**218**). If the user decides to select a television program, the user selects a television program, search program **200** displays the selected television program (**220**), and search program **200** ends (**222**). If the user does not want to select a television program, then search program **200** ends (**222**).

FIG. **3** is a depiction of the data processing system **300** contained within logical unit **106** (See FIG. **1**). Data processing system **300** comprises processor **302**, boot ram **304**, and LCD controller **305** coupled to system bus **306**. Also connected to system bus **306** is memory controller/cache **308**, which provides an interface to local memory **309**. I/O bus bridge **310** is connected to system bus **306** and provides an interface to I/O bus **312**. Memory controller /cache **308** and I/O bus bridge **310** may be integrated as depicted. Peripheral components are connected via I/O bus **312**. Typical peripheral components include Universal Asynchronous Receiver Transmitter (UART) **318**, a keypad or touch screen **320**, digital-to-analog converters **328**, analog-to-digital converters **330**, serial interface controller **340**, clocks and timers **342**, cable output to the television **344**, power controller **346**, cable input from the cable provider **348**, and infrared ports **350**. Those skilled in the art will appreciate the depiction of data processing system **300** in FIG. **3** is exemplary and is not intended as an architectural limitation of the present invention. Data processing system **300** may be a separate single controller.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the

parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

What is claimed is:

1. A method of identifying a real-time television signal of interest to a user, the method comprising:

the user entering a search parameter into a logical unit;

simultaneously buffering a plurality of audio voice streams of a plurality of real-time television signals in a plurality of languages;

translating the plurality of audio voice streams into text associated with each of the plurality of real-time television signals in said plurality of languages;

buffering the text into a lexical buffer:

searching said lexical buffer for the search parameter;

displaying a list of said plurality of real-time television signals in said plurality of languages in order of relevance to the search parameter; and

the user selecting a first real-time television signal from the list, whereby the first real-time television signal is displayed on a television in real-time;

wherein the user specifies said plurality of real-time television signals, an amount of buffering time to be allocated for each of the plurality of real-time television signals, and a plurality of time periods for each of the plurality of real-time television signals to be buffered.

2. The method of claim **1** wherein said search parameter is a keyword.

3. The method of claim **1** further comprising searching a closed captioning signal.

4. The method of claim **1** wherein said buffering occurs when a television unit is not activated.

5. The method of claim **1** further comprising decoding said plurality of real-time television signals.

6. The method of claim **1** further comprising linking said search parameter to a second search parameter by at least one logical relationship.

7. The method of claim **1** further comprising comparing said search parameter to a dictionary.

8. The method of claim **7** further comprising obtaining lexically parsed equivalents and searching said plurality of real-time television signals for data that matches said lexically parsed equivalents.

9. The method of claim **1** further comprising comparing said search parameter to a thesaurus.

10. The method of claim **9** further comprising obtaining synonym equivalents and searching said plurality of real-time television signals for data that matches said synonym equivalents.

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