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METHOD FOR PROVIDING INFORMATION ASSOCIATED WITH PROXIMAL SURROUNDINGS TO A VISUALLY IMPAIRED INDIVIDUAL

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ABSTRACT

A system and a method for providing information associated with proximal surroundings to a visually impaired individual using a smart device is disclosed herein. The method comprises receiving, via the smart device, an input query associated with the proximal surrounding of the visually impaired individual; capturing, via an image capturing unit of the smart device, one or more images of the proximal surrounding; extracting, via the smart device, features of the one or more images to generate a feature vector; and processing, via the smart device, the feature vector for generating a sequence of words which combine to give a meaningful description of the one or more images.

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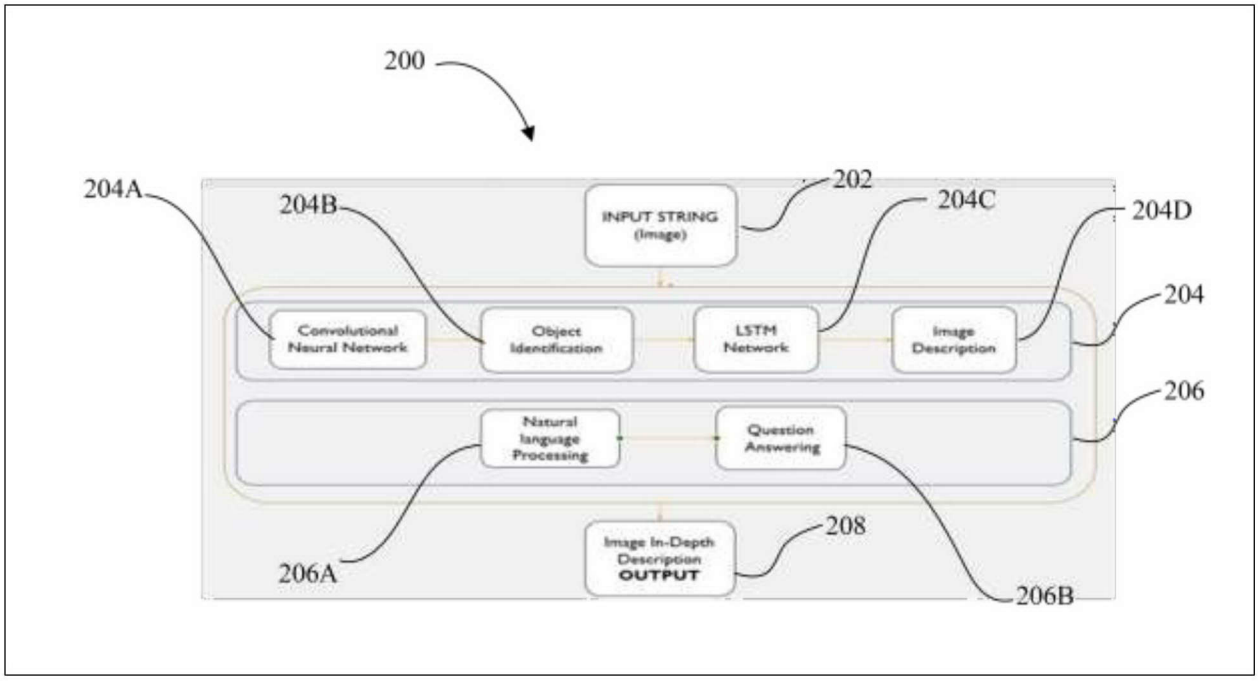

FIG. 2

METHOD FOR PROVIDING INFORMATION ASSOCIATED WITH PROXIMAL SURROUNDINGS TO A VISUALLY IMPAIRED INDIVIDUAL

FIELD

[0001.] The present subject matter relates to the field of computer science. In particular, the present subject matter relates to systems and methods designed for assisting visually impaired individuals by providing them information associated with their proximal surroundings.

BACKGROUND

[0002.] Devices for assisting visually impaired individuals have already been developed in the art. A prototype of smart glasses has been developed by the University of Oxford. Many visually impaired individuals generally have some form of residual vision, which may often limited to the perception of light and movement. The smart glasses is intended to use this residual vision to enable the visually impaired individuals gather information regarding their surroundings for allowing them to move through unknown environments. The smart glasses use a system comprising the glasses, image capturing units, and software for detecting nearby objects and present them to the visually impaired individual in a form that is recognizable to the user.

[0003.] Horus is another device developed in the art for assisting the visually

impaired individuals. Horus comprises a band that wraps around the back of the head along with earpieces and two mounted cameras on one end of the band. The cameras keep a close eye on what is in front of the wearer, and can dictate what it sees through the earpiece, which uses bone conduction technology to bypass the ear canal and stimulate the tiny ear bones directly. that way, the user can still hear what's happening around them, and the device's narration won't disturb anyone else.

[0004.] Many other such devices have been developed in the art. However, a general disadvantageous aspect of such devices is that they require specially designed hardware, and software that has been developed specifically for the specially designed hardware. Due to this, such devices are generally expensive and not affordable to many.

[0005.] As such, there is felt a need for a system and method for assisting visually impaired individuals without the need of any specially designed hardware that is expensive.

SUMMARY

[0006.] The present subject matter envisages a method for providing information associated with proximal surroundings to a visually impaired individual using a smart device. The method comprises receiving, via the

smart device, an input query associated with the proximal surrounding of the visually impaired individual; capturing, via an image capturing unit of the smart device, one or more images of the proximal surrounding; extracting, via the smart device, features of the one or more images to generate a feature vector; and processing, via the smart device, the feature vector for generating a sequence of words which combine to give a meaningful description of the one or more images.

[0007.] In a non-limiting exemplary embodiment, the extraction of features may include an optical character recognition module, a currency detection module, and an obstacle detection module.

[0008.] In a non-limiting exemplary embodiment, the method is executed via an application configured on the smart device of the visually impaired individual.

[0009.] In a non-limiting exemplary embodiment, the smart device includes a smartphone, a laptop, and a tablet.

[0010.] In a non-limiting exemplary embodiment, at least one of an external camera, external microphone, and an external earphone is coupled to the smart device for adequate sensitivity and feedback.

BRIEF DESCRIPTION OF DRAWINGS

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[0011.] The aspects and other features of the subject matter will be better understood with regard to the following description, appended claims, and accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference number in different figures indicates similar or identical items.

[0012.] FIG. 1 illustrates a block diagram for a method for assisting visually impaired individuals, in accordance with an embodiment of the present subject matter.

[0013.] FIG. 2 illustrates a block diagram for a system for assisting visually impaired individuals, in accordance with an embodiment of the present subject matter.

DETAILED DESCRIPTION

[0014.] The present subject matter envisages a method and a system for providing assistance to visually impaired individuals by relaying information to the user regarding the proximal surroundings of the user. An advantageous aspect of the method and system of the present subject matter is that they can be installed on and operated via smart devices, e.g., smartphones and tablets. Such a design eliminates the need of having specially designed expensive

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hardware, such as Horus or Smartglasses described in the background section of the present disclosure.

[0015.] FIG. 1 is a flow diagram 100 depicting the for providing information associated with proximal surroundings 100 (hereinafter referred to as method 100) to a visually impaired individual using a smart device, in accordance with one or more exemplary embodiments. Method 100 is preferably carried out in view of FIG. 1, however method 100 can also be carried out in other desired environments.

[0016.] The order in which the method 200 is described is not intended to be construed as a limitation, and any number of the described method blocks can be combined in any order to implement the method or any alternative methods. Additionally, individual blocks may be deleted from the method without departing from the spirit and scope of the subject matter described herein. Furthermore, the method can be implemented in any suitable hardware, software, firmware, or combination thereof.

[0017.] At block 102, the method 100 comprises receiving, via the smart device, an input query associated with the proximal surrounding of the visually impaired individual. An input query may be provided by the user via audio or may be typed into an app that is loaded on the smart device.

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[0018.] At block 104, the method 100 comprises capturing, via an image capturing unit of the smart device, one or more images of the proximal surroundings. For example, the user may capture images that relate to the input query using the smart device. The smart device may be a smartphone, and the image capturing unit can be the camera of the smartphone. It is to be noted that the sequence of the steps 102 & 104 may be interchanged in some embodiments.

[0019.] At block 106, the method 100 comprises extracting, via the smart device, features of the one or more images to generate a feature vector. The feature vector, in accordance with an embodiment of the present subject matter, is a set of features that are identified by the smart device. In a non-limiting exemplary embodiment, the extraction of features may include an optical character recognition module, a currency detection module, and an obstacle detection module.

[0020.] At block 108, the method 100 comprises processing, via the smart device, the feature vector for generating a sequence of words which combine to give a meaningful description of the one or more images. This sequence of words, in accordance with one embodiment of the present subject matter, is played back to the visually impaired individual to provide them accurate information of their immediate proximal surroundings.

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[0021.] In accordance with one embodiment, the user may ask more questions based on the same set of images regarding which the user may have received a response in the prior iteration. The nature of the question may be a bit more detailed query the information of which may not have been provided by the smart device in the prior response. In such a scenario, the smart device is configured to reanalyse the previously captured images to fetch an appropriate response.

[0022.] In a non-limiting exemplary embodiment, at least one of an external camera, external microphone, and an external earphone is coupled to the smart device for adequate sensitivity and feedback.

[0023.] FIG. 2 illustrates a block diagram for a system for assisting visually impaired individuals 200 (hereinafter referred to as system 200), in accordance with an embodiment of the present subject matter. The system 200 is operable in a smart device. The various modules of the system 200, in accordance with an embodiment of the present subject matter, are configured to utilise the various hardware components of the smart device, including but not limited to, processor, memory, microphones, speaker, and so on.

[0024.] The system 200 comprises an input string module 202 for processing the input query provided to the smart device by the visually impaired individual. As mentioned previously, the input query may be typed or may be

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in the form of an audio query. The input string module 202 is the feature of the system 200 that receives the input query from the visually impaired user.

[0025.] The system 200 further comprises a feature extraction module 204. The feature extraction module 204, in accordance with an embodiment of the present subject matter, either comprises or is communicatively coupled to a convolutional neural network (CNN) 204A, an object identification module 204B, an LSTM network 204C, and an image description module 204D. All the aforementioned modules of the feature extraction module 204 are machine learning modules.

[0026.] The system 200 further comprises an output generation module 206 that is communicatively coupled to the feature extraction module 204. As explained with respect to FIG. 1, the feature vector is generated by the feature extraction module 204. Once the feature vector is generated, the same is then processed by the output generation module 206, where the output generation module 206 is generates a sequence of words to best describe the features of the feature vector. The output generation module 206 comprises a natural language processing module 206A and a question answering module 206B.

[0027.] As mentioned previously, the question answering module 206B facilitates generation of the responses for subsequent questions asked by the

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user on the same set of images, without the need of having to recapture the images.

[0028.] The system 200 further comprises an image in-depth description output module 208 communicatively coupled to the output generation module 206. image in-depth description output module 208 is configured to generate an audio signal describing in the output generated by the output generation module 206.

TECHNICAL ADVANCES AND ADVANTAGES OF THE INVENTION

[0029.] The presently disclosed invention, as described herein above, provides several technical advances and advantages including, but not limited to, a system & method for assisting visually impaired individuals, which

– is simple;

– is economic;

– is easy to configure;

– is easy to operate; and

– does not require any specifically designed hardware.

CLAIMS

1. A method for providing information associated with proximal surroundings to a visually impaired individual using a smart device, the method comprising:

receiving, via the smart device, an input query associated with the proximal surrounding of the visually impaired individual;

capturing, via an image capturing unit of the smart device, one or more images of the proximal surroundings;

extracting, via the smart device, features of the one or more images to generate a feature vector; and

processing, via the smart device, the feature vector for generating a sequence of words which combine to give a meaningful description of the one or more images.

2. The method according to claim 1, wherein the extraction of features may include an optical character recognition module, a currency detection module, and an obstacle detection module.

3. The method according to claim 1, wherein the method is executed via an application configured on the smart device of the visually impaired individual.

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4. The method according to claim 1, wherein the smart device includes a smartphone, a laptop, and a tablet.

5. The method according to claim 1, wherein at least one of an external camera, external microphone, and an external earphone is coupled to the smart device for adequate sensitivity and feedback.

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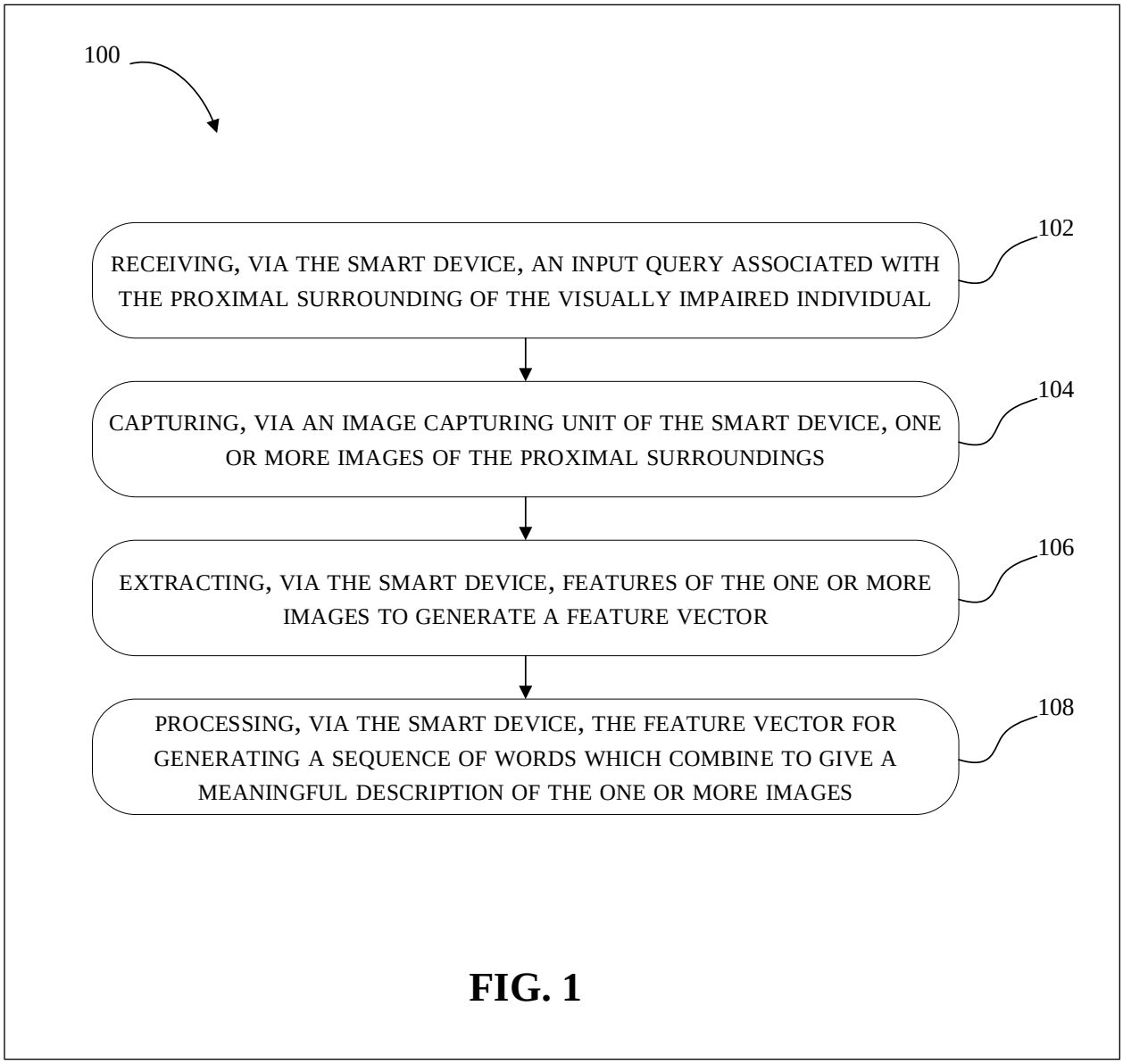

FIG. 1

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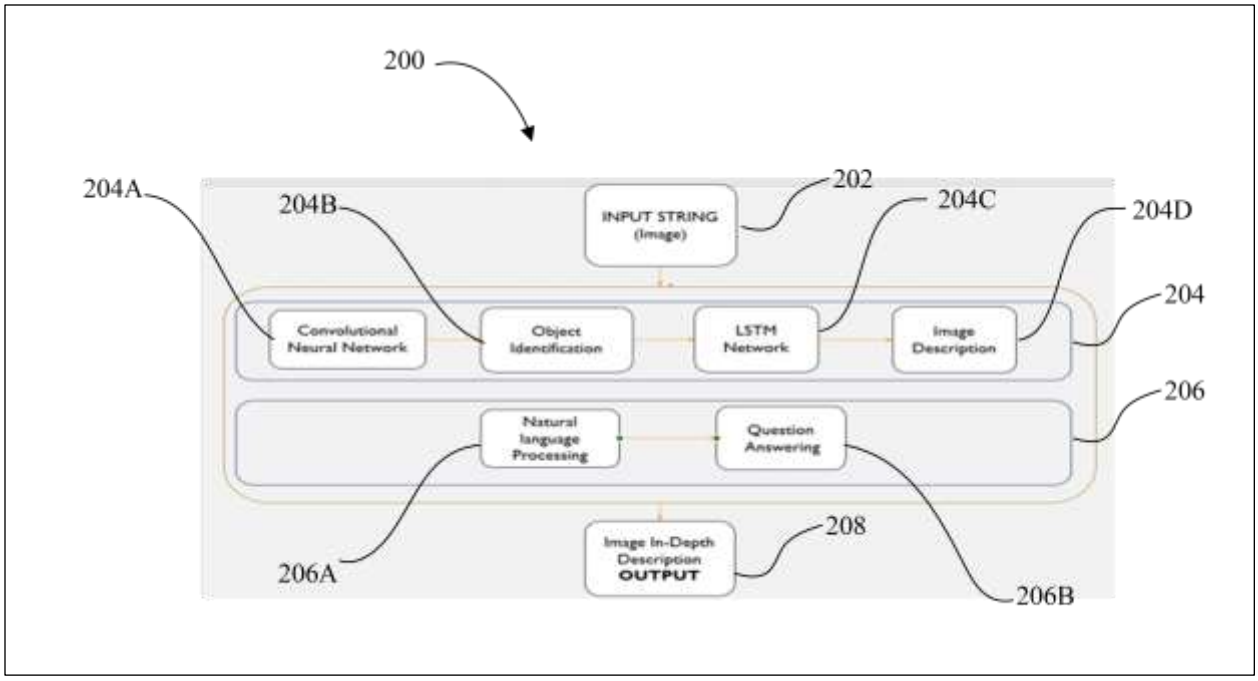

FIG. 2