[4] An electronic device according to various embodiments herein may include a display, at least one processor including processing circuitry and memory storing instructions. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to display a first image including a sketch, based on a first drawing input. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to receive a second drawing input corresponding to a circular drawing around at least part of the sketch included in the first image. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to determine the second drawing input, corresponding to the circular drawing around the at least part of the sketch included in the first image, as a control command for generating image from sketch. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to identify, based on determining the second drawing input as the control command for generating image from sketch, one or more first attributes of the sketch. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to identify an object including one or more second attributes corresponding to the identified one or more first attributes of the sketch. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to generate a second image including the identified object. The instructions, when executed by the at least one processor individually or collectively, may cause the electronic device to provide the second image.

[5] A method, performed by an electronic device, for generating image from sketch, the method according to various embodiments herein may include displaying a first image including a sketch, based on a first drawing input. The method may include receiving a second drawing input corresponding to a circular drawing around at least part of the sketch included in the first image. The method may include determining the second drawing input, corresponding to the circular drawing around the at least part of the sketch included in the first image, as a control command for generating image from sketch. The method may include identifying, based on determining the second drawing input as the control command for generating image from sketch, one or more first attributes of the sketch. The method may include identifying an object including one or more second attributes corresponding to the identified one or more first attributes of the sketch. The method may include generating a second image including the identified object. The method may include providing the second image.

[6] One of more non-transitory computer-readable storage media storing instructions that, when executed by at least one processor of an electronic device individually or collectively, cause the electronic device to perform operations, the operations according to various embodiments herein may include displaying a first image including a sketch, based on a first drawing input. The operations may include receiving a second drawing input corresponding to a circular drawing around at least part of the sketch included in the first image. The operations may include determining the second drawing input, corresponding to the circular drawing around the at least part of the sketch included in

the first image, as a control command for generating image from sketch;identifying, based on determining the second drawing input as the control command for generating image from sketch, one or more first attributes of the sketch. The operations may include identifying an object including one or more second attributes corresponding to the identified one or more first attributes of the sketch. The operations may include generating a second image including the identified object. The operations may include providing the second image.

【Advantageous Effects of Invention】

[7] Various embodiments of the disclosure for example, can provide high-level image processing function considering a scene or a subject included in an image through an intuitive user input.

[8] Effects of the disclosure are not limited to the above-mentioned effects, and other effects which have not been mentioned above can be clearly understood from the following description by those skilled in the art.

【Brief Description of Drawings】

[9] FIG. 1 is a block diagram of an electronic device within a network environment according to various embodiments.

[10] FIG. 2 is a block diagram illustrating a configuration of the electronic device according to various embodiments.

[11] FIGS. 3A and 3B are diagrams illustrating a process of editing an image according to various embodiments.

[12] FIGS. 4A, 4B, and 4C are diagrams illustrating a process of recognizing an object,

algorithms, programs, instructions, and the like that perform functions of the electronic device 101. For example, the memory 130 may store images, image editing algorithms, preliminary object images (or, object images, images), and image editing models learned by machine learning or deep learning. For example, the image editing models may include an image analysis model, a user input analysis model, a preliminary object generation model, an atmosphere/lighting model, and/or a depth map generation model. For example, the image editing mode based on artificial intelligence may include a plurality of artificial neural network layers. The artificial neural network may be one of a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), restricted Boltzmann machine (RBM), a deep belief network (DBN), bidirectional recurrent deep neural network (BRDNN), deep Q-networks, or a combination of two or more thereof, but is not limited thereto. The image editing models based on artificial intelligence may be included in one artificial intelligence computing module included in the electronic device 101 or may be included in different artificial intelligence computing models, respectively. For example, the image editing models based on artificial intelligence may be included in one artificial intelligence computing module included in a separate server (for example, the server 108 of FIG. 1) or may be included in different artificial intelligence computing models, respectively. The image editing models based on artificial intelligence may be logic, firmware, software, and/or hardware modules capable of performing the operation through at least one artificial intelligence computing module.

[57] The processor 120 (for example, the processor 120 of FIG. 1) may control each

processor may identify the user input for modifying the object (for example, for changing texture, changing a color, adding a color, etc.). For example, the user input may be identified as the input for adding the object when the user input is a drawing input on the display 160, and the user input may be identified as the input for modifying the object when the user input is a drawing input through a motion sensor (for example, an acceleration sensor).

[60] According to an embodiment, the user input may be an input using various input devices and/or an input using various input schemes, and the processor 120 may identify the user input, based on the type of input device and/or the input scheme. For example, the processor 120 may identify the user input as the input for adding the object when the user input is a drawing by an electronic pen, and may identify the user input as the input for modifying the object when the user input is a drawing by a finger. For example, the processor 120 may identify the input for adding the object when a drawing is made without pressing of a button of the electronic pen, and may identify the input for modifying the object when the drawing is made in the state where the button of the electronic pen is pressed.

[61] When the user input is identified as the input for adding the object (for example, a first object), the processor 120 may make a request for generating a preliminary object image (for example, a preliminary image of the first object, a first object image, a first image including the first object) to an artificial intelligence-based computing device (for example, an artificial intelligence-based computing module or an artificial intelligence-based image editing model). For example, the preliminary

【CLAIMS】

【Claim 1】

An electronic device comprising:

a display;

at least one processor including processing circuitry; and

memory storing instructions that, when executed by the at least one processor individually or collectively, cause the electronic device to:

display a first image including a sketch, based on a first drawing input,

receive a second drawing input corresponding to a circular drawing around at least part of the sketch included in the first image,

determine the second drawing input, corresponding to the circular drawing around the at least part of the sketch included in the first image, as a control command for generating image from sketch,

identify, based on determining the second drawing input as the control command for generating image from sketch, one or more first attributes of the sketch,

identify an object including one or more second attributes corresponding to the identified one or more first attributes of the sketch,

generate a second image including the identified object, and

provide the second image.

【Claim 2】

The electronic device of claim 1,

wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

identify a first object including the identified one or more first attributes based on the sketch, and

wherein the generated second image includes the identified object corresponding to the first object.

【Claim 3】

The electronic device of claim 2, wherein:

the identified one or more first attributes include at least one shape of one or more drawing elements in the sketch, and

the first object identified based on the sketch is identified based on the at least one shape.

【Claim 4】

The electronic device of claim 1, wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

receive an input of text related to the sketch, and

identify the one or more first attributes of the sketch based at least partially on the text related to the sketch.

【Claim 5】

The electronic device of claim 4, wherein text related to the sketch is handwritten text.

【Claim 6】

The electronic device of claim 4, wherein text related to the sketch is text other than handwritten text.

【Claim 7】

The electronic device of claim 4, wherein the first image includes the text related to the sketch.

【Claim 8】

The electronic device of claim 4,

wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

identify a first object including the identified one or more first attributes based on the sketch and the text related to the sketch, and

wherein the generated second image includes the identified object corresponding to the first object.

【Claim 9】

The electronic device of claim 8,

wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

identify at least one first background attribute of the one or more first attributes of the sketch, based on at least one of the sketch or the text related to the sketch, and

wherein the generated second image including the identified object includes at least one second background attribute corresponding to the at least one first background attribute.

【Claim 10】

The electronic device of claim 4, wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

receive an input for modifying the text related to the sketch,

identify one or more modified first attributes of the of the sketch, based on the sketch and the modified text related to the sketch,

identify a second object including one or more third attributes corresponding to the identified one or more modified first attributes of the sketch,

generate a third image including the second object, and

provide the generated third image.

【Claim 11】

The electronic device of claim 4, wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

receive an input of additional text related to the sketch,

identify one or more additional first attributes of the sketch, based on the additional text related to the sketch,

identify a third object including one or more fourth attributes corresponding to the identified one or more additional first attributes of the sketch,

generate a fourth image including the third object, and

provide the generated fourth image.

【Claim 12】

The electronic device of claim 1, wherein the instructions, when executed by the at least one processor individually or collectively, further cause the electronic device to:

display, when providing the second image, the generated second image on a first area of the display together with the first image on a second area of the display.

【Claim 13】

The electronic device of claim 1, wherein the generated second image includes a plurality of second images.

【Claim 14】

The electronic device of claim 1, wherein the second image has more visual detail than the sketch.

【Claim 15】

A method, performed by an electronic device, for generating image from sketch, the method comprising:

displaying a first image including a sketch, based on a first drawing input;

receiving a second drawing input corresponding to a circular drawing around at least part of the sketch included in the first image;

determining the second drawing input, corresponding to the circular drawing around the at least part of the sketch included in the first image, as a control command for generating image from sketch;

identifying, based on determining the second drawing input as the control command for generating image from sketch, one or more first attributes of the sketch;

identifying an object including one or more second attributes corresponding to the identified one or more first attributes of the sketch;

generating a second image including the identified object; and

providing the second image.