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ELECTRONIC DEVICE AND METHOD FOR ACQUIRING IMAGE DATA ON BASIS OF COMPOSITING IMAGES

Abstract

An electronic device is provided. The electronic device includes a camera including an image sensor, memory, comprising one or more storage media, storing one or more computer programs, and one or more processors communicatively coupled to the camera and the memory, wherein the one or more computer programs include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify, based on capability information of the image sensor, maximum exposure time of the camera as a first time interval, obtain, based on exposure time set as the first time interval, a first image using the camera, identify a second image constituting a first frame stored in the memory, obtain, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtain video data consisting of a plurality of frames including the first frame and the second frame.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S) [0001] This application is a continuation application, claiming priority under 35 U.S.C. § 365(c), of an International application No. PCT/KR2023/017038, filed on Oct. 30, 2023, which is based on and claims the benefit of a Korean patent application number 10-2022-0144089, filed on Nov. 1, 2022, in the Korean Intellectual Property Office, and of a Korean patent application number 10-2022-0171022, filed on Dec. 8, 2022, in the Korean Intellectual Property Office, the disclosure of each of which is incorporated by reference herein in its entirety.

BACKGROUND
1. Field
[0002] The disclosure relates to an electronic device and a method for obtaining video data based on synthesizing images.
2. Description of Related Art
[0003] As technology advances, an electronic device may obtain video data through various photographing techniques. For example, the electronic device may generate video data by compressing a video recorded over a long duration into a relatively short duration. As the generated video data is configured with a relatively short duration, it may be configured with a smaller size than a normal video of the same photographing time.
[0004] The above information is presented as background information only to assist with an understanding of the disclosure. No determination has been made, and no assertion is made, as to whether any of the above might be applicable as prior art with regard to the disclosure.
SUMMARY
[0005] Aspects of the disclosure are to address at least the above-mentioned problems and/or disadvantages and to provide at least the advantages described below. Accordingly, an aspect of the disclosure is to provide an electronic device and a method for obtaining video data based on synthesizing images.
[0006] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented embodiments.
[0007] In accordance with an aspect of the disclosure, an electronic device is provided. The electronic device includes a camera including an image sensor, memory, comprising one or more storage media, storing one or more computer programs, and one or more processors communicatively coupled to the camera and the memory, wherein the one or more computer programs include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify, based on capability information of the image sensor, maximum exposure time of the camera as a first time interval, obtain, based on exposure time set as the first time interval, a first image using the camera, identify a second image constituting a first frame stored in the memory, obtain, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtain video data consisting of a plurality of

frames including the first frame and the second frame.
[0008] In accordance with another aspect of the disclosure, a method performed by an electronic device is provided. The method includes identifying, by the electronic device, based on capability information of an image sensor of a camera of the electronic device, maximum exposure time of the camera as a first time interval, obtaining, by the electronic device, based on exposure time set as the first time interval, a first image using the camera, identifying, by the electronic device, a second image constituting a first frame stored in memory of the electronic device, obtaining, by the electronic device, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtaining, by the electronic device, video data consisting of a plurality of frames including the first frame and the second frame.
[0009] In accordance with another aspect of the disclosure, one or more non-transitory computer-readable storage media storing one or more computer programs including computer-executable instructions that, when executed by one or more processors of an electronic device individually or collectively, cause the electronic device to perform operations are provided. The operations include identifying, by the electronic device, based on capability information of an image sensor of a camera of the electronic device, maximum exposure time of the camera as a first time interval, obtaining, by the electronic device, based on exposure time set as the first time interval, a first image using the camera, identifying, by the electronic device, a second image constituting a first frame stored in memory of the electronic device, obtaining, by the electronic device, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtaining, by the electronic device, video data consisting of a plurality of frames including the first frame and the second frame.
[0010] Other aspects, advantages, and salient features of the disclosure will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses various embodiments of the disclosure.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0011] The above and other aspects, features, and advantages of certain embodiments of the disclosure will be more apparent from the following description taken in conjunction with the accompanying drawings, in which:
[0012] FIG. **1** is a block diagram of an electronic device in a network environment according to an embodiment of the disclosure;
[0013] FIG. **2** illustrates an example of simplified block diagrams of an electronic device according to an embodiment of the disclosure;
[0014] FIG. **3** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure;
[0015] FIG. **4** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure;
[0016] FIG. **5** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure;
[0017] FIGS. **6**A, **6**B, and **6**C illustrate an example of an operation of an electronic device according to various embodiments of the disclosure;
[0018] FIGS. **7**A and **7**B illustrate an example of an operation of an electronic device according to various embodiments of the disclosure;
[0019] FIG. **8** is a flowchart illustrating an operation of an electronic device according to an

embodiment of the disclosure;
[0020] FIG. **9** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure;
[0021] FIG. **10** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure;
[0022] FIG. **11** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure;
[0023] FIG. **12** is a flowchart illustrating an operation of an electronic device, according to an embodiment of the disclosure;
[0024] FIGS. **13**A and **13**B illustrate an example of an operation of an electronic device according to various embodiments of the disclosure;
[0025] FIG. **14** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure;
[0026] FIG. **15** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure;
[0027] FIG. **16** is a flowchart illustrating an operation of an electronic device, according to an embodiment of the disclosure;
[0028] FIG. **17**A illustrates an example of an operation of an electronic device according to an embodiment of the disclosure; and
[0029] FIG. **17**B illustrates an example of an operation of an electronic device according to an embodiment of the disclosure.
[0030] Throughout the drawings, it should be noted that like reference numbers are used to depict the same or similar elements, features, and structures.

DETAILED DESCRIPTION

[0031] The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of various embodiments of the disclosure as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the various embodiments described herein can be made without departing from the scope and spirit of the disclosure. In addition, descriptions of well-known functions and constructions may be omitted for clarity and conciseness.
[0032] The terms and words used in the following description and claims are not limited to the bibliographical meanings, but, are merely used by the inventor to enable a clear and consistent understanding of the disclosure. Accordingly, it should be apparent to those skilled in the art that the following description of various embodiments of the disclosure is provided for illustration purpose only and not for the purpose of limiting the disclosure as defined by the appended claims and their equivalents.
[0033] It is to be understood that the singular forms “a,” “an,” and “the” include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to “a component surface” includes reference to one or more of such surfaces.
[0034] It should be appreciated that the blocks in each flowchart and combinations of the flowcharts may be performed by one or more computer programs which include instructions. The entirety of the one or more computer programs may be stored in a single memory device or the one or more computer programs may be divided with different portions stored in different multiple memory devices.
[0035] Any of the functions or operations described herein can be processed by one processor or a combination of processors. The one processor or the combination of processors is circuitry performing processing and includes circuitry like an application processor (AP, e.g. a central processing unit (CPU)), a communication processor (CP, e.g., a modem), a graphics processing unit (GPU), a neural processing unit (NPU) (e.g., an artificial intelligence (AI) chip), a wireless fidelity

(Wi-Fi) chip, a Bluetooth® chip, a global positioning system (GPS) chip, a near field communication (NFC) chip, connectivity chips, a sensor controller, a touch controller, a finger-print sensor controller, a display driver integrated circuit (IC), an audio CODEC chip, a universal serial bus (USB) controller, a camera controller, an image processing IC, a microprocessor unit (MPU), a system on chip (SoC), an IC, or the like.

[0036] FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to an embodiment of the disclosure.

[0037] Referring to FIG. **1**, the electronic device **101** in the network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or at least one of an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). According to an embodiment, the electronic device **101** may communicate with the electronic device **104** via the server **108**. According to an embodiment, the electronic device **101** may include a processor **120**, memory **130**, an input module **150**, a sound output module **155**, a display module **160**, an audio module **170**, a sensor module **176**, an interface **177**, a connecting terminal **178**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identification module (SIM) **196**, or an antenna module **197**. In some embodiments, at least one of the components (e.g., the connecting terminal **178**) may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. In some embodiments, some of the components (e.g., the sensor module **176**, the camera module **180**, or the antenna module **197**) may be implemented as a single component (e.g., the display module **160**).

[0038] The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor **120** may store a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. According to an embodiment, the processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor **123** (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. For example, when the electronic device **101** includes the main processor **121** and the auxiliary processor **123**, the auxiliary processor **123** may be adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

[0039] The auxiliary processor **123** may control at least some of functions or states related to at least one component (e.g., the display module **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active state (e.g., executing an application). According to an embodiment, the auxiliary processor **123** (e.g., an image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**. According to an embodiment, the auxiliary processor **123** (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. An artificial intelligence model may be generated by machine learning. Such learning may be performed, e.g., by the electronic device **101** where the artificial intelligence is performed or via a separate server (e.g., the server **108**). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

[0040] The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**.

[0041] The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

[0042] The input module **150** may receive a command or data to be used by another component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input module **150** may include, for example, a microphone, a mouse, a keyboard, a key (e.g., a button), or a digital pen (e.g., a stylus pen).

[0043] The sound output module **155** may output sound signals to the outside of the electronic device **101**. The sound output module **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

[0044] The display module **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display module **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an embodiment, the display module **160** may include a touch sensor adapted to detect a touch, or a pressure sensor adapted to measure the intensity of force incurred by the touch.

[0045] The audio module **170** may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module **170** may obtain the sound via the input module **150**, or output the sound via the sound output module **155** or a headphone of an external electronic device (e.g., an electronic device **102**) directly (e.g., wiredly) or wirelessly coupled with the electronic device **101**.

[0046] The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

[0047] The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly (e.g., wiredly) or wirelessly. According to an embodiment, the interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

[0048] A connecting terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). According to an embodiment, the connecting terminal **178** may include, for example, an HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

[0049] The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.
[0050] The camera module **180** may capture a still image or moving images. According to an embodiment, the camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.
[0051] The power management module **188** may manage power supplied to the electronic device **101**. According to an embodiment, the power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).
[0052] The battery **189** may supply power to at least one component of the electronic device **101**. According to an embodiment, the battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.
[0053] The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the second network **199** (e.g., a long-range communication network, such as a legacy cellular network, a fifth generation (5G) network, a next-generation communication network, the Internet, or a computer network (e.g., LAN or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify and authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module **196**.
[0054] The wireless communication module **192** may support a 5G network, after a fourth generation (4G) network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module **192** may support a high-frequency band (e.g., the millimeter-wave (mmWave) band) to achieve, e.g., a high data transmission rate. The wireless communication module **192** may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication module **192** may support various requirements specified in the electronic device **101**, an external electronic device (e.g., the electronic device **104**), or a network system (e.g., the second network **199**). According to an embodiment, the wireless communication module **192** may support a peak data rate (e.g., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for

implementing URLLC.
[0055] The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. According to an embodiment, the antenna module **197** may include an antenna including a radiating element composed of a conductive material or a conductive pattern formed in or on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module **197** may include a plurality of antennas (e.g., array antennas). In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** (e.g., the wireless communication module **192**) from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. According to an embodiment, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.
[0056] According to various embodiments, the antenna module **197** may form a mmWave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, an RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mmWave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.
[0057] At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).
[0058] According to an embodiment, commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. Each of the electronic devices **102** or **104** may be a device of a same type as, or a different type, from the electronic device **101**. According to an embodiment, all or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102** or **104**, or the server **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device **101** may provide ultra low-latency services using, e.g., distributed computing or mobile edge computing. In another embodiment, the external electronic device **104** may include an internet-of-things (IoT) device. The server **108** may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device **104** or the server **108** may be included in the second network **199**. The electronic device **101** may be applied to intelligent services (e.g., smart home, smart city, smart car, or healthcare) based on 5G communication technology or IoT-related technology.
[0059] According to an embodiment, an electronic device (e.g., the electronic device **101**) may obtain video data by compressing images (or video) taken for a long time to a short time. The electronic device may obtain video data including a visual object indicating an external object (e.g.,

a star). The electronic device may obtain video data indicating a trajectory of an external object (e.g., a star) based on synthesizing images taken for a long time. In the following specification, technical features for obtaining video data indicating a trajectory of an external object (e.g., a star) may be described.

[0060] FIG. **2** illustrates an example of simplified block diagrams of an electronic device according to an embodiment of the disclosure.

[0061] Referring to FIG. **2**, the electronic device **200** may include some or all of components of the electronic device **101** illustrated in FIG. **1**. For example, the electronic device **200** may correspond to the electronic device **101** of FIG. **1**.

[0062] According to an embodiment, the electronic device **200** may include a processor **210**, a camera **220**, and/or memory **230**. According to an embodiment, the electronic device **200** may include at least one of the processor **210**, the camera **220**, and the memory **230**. For example, at least a portion of the processor **210**, the camera **220**, and the memory **230** may be omitted according to an embodiment.

[0063] According to an embodiment, the electronic device **200** may include a processor **210**. The processor **210** may be operably coupled or connected with the camera **220** and the memory **230**. The processor **210** being operably coupled or connected with the camera **220** and the memory **230** may mean that the processor **210** may control the camera **220** and the memory **230**.

[0064] For example, the processor **210** may control the camera **220** and the memory **230**. The camera **220** and the memory **230** may be controlled by the processor **210**. For example, the processor **210** may be configured with at least one processor. For example, the processor **210** may include at least one processor. For example, the processor **210** may correspond to the processor **120** of FIG. **1**.

[0065] According to an embodiment, the processor **210** may include a hardware component for processing data based on one or more instructions. The hardware component for processing data may include, for example, an arithmetic and logic unit (ALU), a field programmable gate array (FPGA), and/or a central processing unit (CPU).

[0066] According to an embodiment, the electronic device **200** may include the camera **220**. For example, the camera **220** may be used to obtain image or video data of an external object. For example, image data (and/or photograph) captured using the camera **220** may mean one image obtained from the camera **220**. For example, video data captured using the camera **220** may mean a sequence of a plurality of images obtained from the camera **220** according to a designated frame rate. For example, the camera **220** may at least partially correspond to the camera module **180** of FIG. **1**.

[0067] For example, the camera **220** may include at least one sensor. The at least one sensor may include an image sensor (or an optical sensor). The image sensor may be used to obtain an image, based on processing data obtained through the camera **220** (e.g., a lens of the camera **220**). The image sensor may convert light received through a lens of the camera **220** into an electrical signal. For example, the image sensor may include at least one of a charge-coupled device (CCD) image sensor and a complementary metal oxide semiconductor (CMOS) image sensor. According to an embodiment, the processor **210** may identify a maximum exposure time of the camera **220** based on capability information of the image sensor.

[0068] According to an embodiment, the electronic device **200** may include the memory **230**. For example, the memory **230** may be used to store one or more programs. The one or more programs may include instructions which, when executed by the processor **210** of the electronic device **200**, cause the electronic device **200** to perform a predefined operation. For example, the memory **230** may correspond to the memory **130** of FIG. **1**. For example, the memory **230** may be a volatile memory unit or units. For example, the memory **230** may be a nonvolatile memory unit or units. For example, the memory **230** may be another type of computer-readable medium, such as a magnetic or optical disk. For example, the memory **230** may store data obtained based on an

operation (e.g., an operation of executing an algorithm) performed by the processor **210**.
[0069] FIG. **3** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **3** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.
[0070] Referring to FIG. **3**, the processor **210** of the electronic device **200** may obtain hyper-lapse (or time-lapse) video data. The hyper-lapse video data may refer to video data in which at least one image (or frame) taken for a relatively long time through a camera (e.g., the camera **220** of FIG. **2**) is processed to be played for a relatively short time. The processor **210** may obtain the hyper-lapse video data by processing at least one image (or frame) taken for a relatively long time through the camera **220** to be played for a relatively short time.
[0071] According to an embodiment, the processor **210** may set an exposure time of the camera **220** as a time interval **301**. The processor **210** may process data obtained using the camera **220** for a time interval **302**, based on the exposure time set as the time interval **301**. The processor **210** may obtain a first image by processing the data for the time interval **302**. The processor **210** may set the first image as a first frame **310-1**. For example, the time interval **302** may include a waiting time for resetting an image sensor to read next frame. For example, the time interval **302** may include a readout time for converting light into an electrical signal or outputting the converted electrical signal. For example, the time interval **302** may be changed based on the time interval **301**.
[0072] According to an embodiment, the processor **210** may set a plurality of frames **310**, like the first frame **310-1**. The plurality of frames **310** may consist of video data (e.g., hyper-lapse video data). For example, the processor **210** may configure one frame per a time interval **303** including the time interval **301** and the time interval **302**. For example, when the time interval **303** is 0.5 seconds, one frame per 0.5 second may be configured. According to an embodiment, video data consisting of the plurality of frames **310** may be set to be played at 30 frames per second. For example, video data may be played at 30 frame per second (fps). Accordingly, a video played for 1 second in video data may indicate an actual time of 15 seconds. In other words, the processor **210** may configure video data at a 15-times speed.
[0073] According to an embodiment, the processor **210** may reset an image sensor included in the camera **220** after the time interval **303** has elapsed. The processor **210** may reset the image sensor to obtain a second image distinct from the first image and set the second image as a frame **310-2**.
[0074] According to an embodiment, the processor **210** may change exposure time of the camera **220**. The processor **210** may increase the amount of light for obtaining an image, by setting the exposure time of the camera **220** to be long in a dark environment. According to an embodiment, the processor **210** may change light sensitivity (e.g., an international standard organization (ISO) value). The processor **210** may set a brightness value of the obtained image to be high by setting the light sensitivity of the camera **220** to be high in a dark environment.
[0075] FIG. **4** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **4** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **410** to **450** may be related to an operation for obtaining video data.
[0076] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.
[0077] Referring to FIG. **4**, in operation **410**, the processor **210** may identify a maximum exposure time of the camera **220** as a first time interval, based on capability information of an image sensor.
[0078] According to an embodiment, the processor **210** may identify capability information of an image sensor of the camera **220**. The processor **210** may identify a maximum exposure time of the camera **220** capable of being processed by the image sensor. The processor **210** may identify the maximum exposure time of the camera **220** as a first time interval.
[0079] In operation **420**, the processor **210** may obtain a first image based on the exposure time set

as the first time interval. For example, the processor **210** may obtain the first image based on the exposure time set as the first time, using the camera **220**.

[0080] According to an embodiment, the processor **210** may set the exposure time of the camera **220** as the first time interval, which is the maximum exposure time of the camera **220**. The processor **210** may obtain a first image, by processing data obtained using the camera **220**, based on the exposure time set as the first time interval, during a second time interval distinguished from the first time interval. For example, the processor **210** may obtain the first image while generating (or obtaining) video data consisting of a plurality of frames. The processor **210** may obtain video data consisting of a plurality of frames, based on configuring one frame per a third time interval including the first time interval and the second time interval. For example, the video data may be set to be played at 30 frames per second. For example, the video data may be set to 30 frame per second (fps).

[0081] In operation **430**, the processor **210** may identify the second image constituting the first frame. For example, the processor **210** may obtain the second image before obtaining the first image. The processor **210** may configure the second image as a first frame among a plurality of frames. According to an embodiment, the second image may be an image in which a plurality of images is synthesized. According to an embodiment, the second image may be obtained according to the same or similar operation as operations **410** to **420**.

[0082] In operation **440**, the processor **210** may obtain a third image. For example, the processor **210** may obtain the third image, based on synthesizing the first image and the second image.

[0083] According to an embodiment, the processor **210** may obtain the third image by synthesizing the second image constituting the first frame and the first image obtained after constituting the first frame. For example, the processor **210** may identify a first visual object corresponding to an external object (e.g., a star) among a plurality of objects included in the first image. The processor **210** may identify a second visual object corresponding to an external object (e.g., a star) among a plurality of objects included in the second image. The processor **210** may obtain a third image including the first visual object and the second visual object based on synthesizing the first image and the second image. For example, the third image may represent a trajectory of an external object.

[0084] In operation **450**, the processor **210** may obtain video data consisting of a plurality of frames including a first frame and a second frame. For example, the processor **210** may obtain video data consisting of a plurality of frames including the first frame and the second frame, based on configuring the third image as the second frame, which is next frame after the first frame.

[0085] According to an embodiment, the processor **210** may configure the third image as the second frame, which is next frame after the first frame. The processor **210** may configure the third image, in which the first image and the second image are synthesized, as a second frame, which is next frame after the first frame consisting of the second image so that a trajectory of an external object (e.g., a star) may appear, through video data. As the third image is configured as the second frame, a trajectory of an external object (e.g., a star) over time may be represented by video data. For example, as the second frame is sequentially displayed (or played) following the first frame, a trajectory of an external object (e.g., a star) in the third time interval, including the first time interval and the second time interval, may be displayed.

[0086] According to an embodiment, after the third image is configured as the second frame, the processor **210** may obtain a fourth image by using the camera **220**, based on the exposure time set as the first time interval. Based on identifying that a brightness value related to the fourth image is greater than or equal to a designated brightness value, the processor **210** may configure the fourth image as a third frame, which is the next frame after the second frame. For example, the processor **210** may refrain from synthesizing the fourth image with the third image constituting the second frame, based on identifying that the brightness value of the fourth image is greater than or equal to a designated brightness value. The processor **210** may configure the fourth image as the third frame without synthesizing the fourth image with the third image. For example, when a brightness value of the fourth image is greater than or equal to a designated brightness value, a trajectory of an external object (e.g., a star) may not be identified. By resetting an image synthesis process, the processor **210** may configure the fourth image as the third frame without synthesizing the fourth image with the third image.

[0087] According to an embodiment, the processor **210** may refrain from synthesizing the second image with the first image, based on identifying that a brightness value of the second image is greater than or equal to a designated brightness value.

[0088] According to an embodiment, after the third image is configured as the second frame, the processor **210** may obtain the fourth image by using the camera **220**, based on the exposure time set as the first time interval. The processor **210** may store a fifth image obtained based on synthesizing the third image and the fourth image in the memory **230** (or a buffer of the memory **230**). After the fifth image is stored, the processor **210** may obtain a sixth image by using the camera **220**, based on the exposure time set as the first time interval. Based on synthesizing the fifth image and the sixth image, the processor **210** may obtain a seventh image. The processor **210** may configure the seventh image as the third frame, which is the next frame after the second frame.

[0089] FIG. **5** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **5** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **501** to **513** may be related to an operation for obtaining (or storing) video data.

[0090] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.

[0091] Referring to FIG. **5**, in operation **501**, the processor **210** may identify a maximum exposure time of a camera (e.g., the camera **220** of FIG. **2**). For example, the processor **210** may identify the maximum exposure time of the camera **220**, based on capability information of an image sensor included in the camera **220**. The processor **210** may determine (or identify) a speed of video data compared to an actual time, based on the maximum exposure time of the camera **220**.

[0092] In operation **502**, the processor **210** may identify whether the obtaining of video data starts. For example, the processor **210** may start obtaining video data, based on a user input. The processor **210** may identify whether a user input to start the obtaining of video data is received.

[0093] According to an embodiment, when the obtaining of video data does not start (operation **502**-NO), the processor **210** may perform operation **501**. The processor **210** may wait for a user input to start the obtaining of video data.

[0094] In operation **503**, when the obtaining of video data starts (operation **502**-YES), the processor **210** may set a frame counter. For example, the processor **210** may set the frame counter based on the start of obtaining video data. The processor **210** may set the frame counter to 0.

[0095] According to an embodiment, when the obtaining of video data starts, the processor **210** may execute (or activate) a video codec for performing a video synthesis process.

[0096] In operation **504**, the processor **210** may obtain an image. For example, the processor **210** may obtain an image based on the exposure time of the camera **220** which is set to a maximum exposure time. Operation **504** may correspond to operation **420** of FIG. **4**.

[0097] In operation **505**, the processor **210** may identify whether the frame counter is 0. The processor **210** may identify whether the frame counter is 0 to identify whether it is a first frame for obtaining video data.

[0098] In operation **506**, when the frame counter is not 0 (operation **505**-NO), the processor **210** may identify whether a reset of the image synthesis process is required. For example, the processor **210** may identify whether a reset of the image synthesis process is required, based on identifying that the frame counter is not 0.

[0099] According to an embodiment, the processor **210** may determine whether a reset of the image synthesis process is required, according to a designated condition. For example, the processor **210** may determine that a reset of the image synthesis process is required, based on identifying that a brightness value of the obtained image is greater than or equal to a designated brightness value.

[0100] In operation **507**, when the frame counter is 0 (operation **505**-YES) or a reset of the image process is required (operation **506**-YES), the processor **210** may store the obtained image in a buffer. For example, the processor **210** may store the obtained image in a buffer configured in the memory (e.g., the memory **230** of FIG. **2**), based on identifying that the frame counter is 0. For example, the processor **210** may store the obtained image in a buffer configured in the memory **230**, based on identifying that a reset of the image process is required.

[0101] In operation **508**, when a reset of the image synthesis process is not required (operation **506**-NO), the processor **210** may synthesize the image stored in the buffer and the obtained image. For example, the processor **210** may synthesize the image stored in the buffer and the obtained image, based on identifying that a reset of the image synthesis process is not required. The processor **210** may store the synthesized image in a buffer.

[0102] In operation **509**, the processor **210** may increase the frame counter. For example, the processor **210** may increase the frame counter by 1. For example, the processor **210** may store the obtained image in the buffer or store the synthesized image in the buffer, and then increase the frame counter by 1.

[0103] In operation **510**, the processor **210** may identify whether the obtained image (or the synthesized image) is an image which will constitute video data. For example, the processor **210** may identify whether the obtained image (or synthesized image) is an image which will constitute video data based on the frame counter.

[0104] According to an embodiment, the processor **210** may identify the obtained image as an image which will constitute video data, based on the frame counter being odd (or even). According to an embodiment, the processor **210** may identify the obtained image as an image which will constitute video data, based on the frame counter being one of reference values. According to an embodiment, the processor **210** may change a sampling period based on the number of frame counters. For example, the processor **210** may configure one frame, by obtaining a designated number (or number according to the sampling period) of images and then synthesizing the designated number of images.

[0105] In operation **511**, when the obtained image (or synthesized image) is an image which will constitute video data (operation **510**-YES), the processor **210** may set the obtained image (or synthesized image) as a frame constituting the video data. For example, the processor **210** may set the obtained image as a frame constituting the video data, based on identifying that the obtained image is an image which will constitute video data. For example, the processor **210** may set the obtained image as one of a plurality of frames constituting video data.

[0106] In operation **512**, the processor **210** may identify whether the obtaining of video data is terminated. For example, after setting the obtained image as a frame constituting video data, the processor **210** may identify whether the obtaining of video data is terminated. For example, the processor **210** may identify whether the obtaining of video data is terminated, based on identifying that the obtained image is not an image which will constitute video data.

[0107] According to an embodiment, the processor **210** may identify whether the obtaining of video data is terminated, based on whether another user input distinct from the user input for starting the obtaining of video data is received.

[0108] According to an embodiment, when the obtaining of video data is not terminated (operation **512**-NO), the processor **210** may perform operation **504**. For example, the processor **210** may obtain another image according to operation **504**, in order to add a frame of video data, based on identifying that the obtaining of video data is not terminated.

[0109] In operation **513**, when the obtaining of video data is terminated (operation **512**-YES), the processor **210** may store video data in the memory **230**. For example, the processor **210** may store the video data in the memory **230**, based on identifying that the obtaining of the video data is terminated. For example, the processor **210** may store video data in the memory **230**, based on receiving another user input to terminate the obtaining of video data.

[0110] FIGS. **6**A, **6**B, and **6**C illustrate an example of an operation of an electronic device according to various embodiments of the disclosure. Operations of FIGS. **6**A to **6**C may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.

[0111] Referring to FIG. **6**A, the processor **210** may obtain an image **611** within a time interval **601**. The processor **210** may set the image **611** as a frame **630-1** which is a first frame among a plurality of frames **630**. The processor **210** may store the image **611** in a buffer of memory (e.g., the memory **230** of FIG. **2**).

[0112] According to an embodiment, the processor **210** may obtain an image **612** within a time interval **602**. The processor **210** may obtain an image **622** by synthesizing the image **611** stored in the buffer and the image **612**. The processor **210** may set the image **622** as a frame **630-2** which is a second frame among the plurality of frames **630**. The processor **210** may store the image **622** in the buffer of the memory **230**.

[0113] According to an embodiment, the processor **210** may obtain an image **613** within a time interval **603**. The processor **210** may obtain an image **623** by synthesizing the image **622** stored in the buffer and the image **613**. For example, the processor **210** may obtain the image **623** by synthesizing images **611** to **613**. The processor **210** may set the image **623** as a frame **630-3** which is a third frame among the plurality of frames **630**. The processor **210** may store the image **623** in the buffer of the memory **230**.

[0114] According to an embodiment, the processor **210** may identify (or obtain) the plurality of frames **630** configured with a plurality of images including the image **611**, the image **622**, and the image **623** by repeating the above-described operation. The processor **210** may obtain video data configured with the plurality of frames **630**, and store the obtained video data in the memory **230**.

[0115] According to an embodiment, the processor **210** may accumulate and synthesize a plurality of images, and set the synthesized image as one of a plurality of frames constituting video data. The processor **210** may represent a trajectory of an external object through video data, by setting the synthesized image as one of a plurality of frames constituting data.

[0116] Referring to FIG. **6**B, the processor **210** may obtain an image **611** within a time interval **601**. The processor **210** may set the image **611** as a frame **640-1** which is a first frame among a plurality of frames **640**. The processor **210** may store the image **611** in a buffer of the memory **230**.

[0117] The processor **210** may obtain an image **612** within a time interval **602**. The processor **210** may obtain an image **622** by synthesizing the image **611** stored in the buffer and the image **612**. The processor **210** may store the image **622** in the buffer of the memory **230**. The processor **210** may not configure the image **622** as a frame of video data. The processor **210** may configure only images that are obtained in odd-numbered order as frames of video data.

[0118] According to an embodiment, the processor **210** may obtain an image **613** within a time interval **603**. The processor **210** may obtain an image **623** by synthesizing the image **622** stored in the buffer and the image **613**. For example, the processor **210** may obtain the image **623** by synthesizing images **611** to **613**. The processor **210** may set the image **623** as a frame **640-2** which is a second frame among the plurality of frames **640**. The processor **210** may store the image **623** in the buffer of the memory **230**.

[0119] According to an embodiment, the processor **210** may identify (or obtain) the plurality of frames **640** configured with a plurality of images including the image **611**, the image **623**, and an image **625** by repeating the above-described operation. The processor **210** may obtain video data configured with the plurality of frames **640**, and store the obtained video data in the memory **230**.

[0120] According to an embodiment, the processor **210** may set at least a portion of the obtained images as frames of video data. The processor **210** may represent a trajectory of an external object through video data, by setting at least a portion of the obtained images as frames of video data.

[0121] Referring to FIG. **6**C, the processor **210** may obtain an image **611** within a time interval **601**. The processor **210** may set the image **611** as a frame **650-1** which is a first frame among a plurality of frames **650**. The processor **210** may store the image **611** in a buffer of the memory **230**.
[0122] According to an embodiment, the processor **210** may obtain an image **612** within a time interval **602**. The processor **210** may obtain the image **622** by synthesizing the image **611** stored in the buffer and the image **612**. The processor **210** may set the image **622** as a frame **650-2** which is a second frame among a plurality of frames **650**. The processor **210** may store the image **622** in the buffer of the memory **230**.
[0123] According to an embodiment, the processor **210** may obtain an image **613** within a time interval **603**. The processor **210** may identify a brightness value for the image **613**. The processor **210** may identify that a brightness value for the image **613** is greater than or equal to a designated brightness value. The processor **210** may reset an image synthesis process, based on identifying that the brightness value for the image **613** is greater than or equal to the designated brightness value. The processor **210** may set the image **613** as a frame **650-3** which is a third frame among the plurality of frames **650**. The processor **210** may store the image **613** in the buffer of the memory **230**.
[0124] By repeating the above-described operation, the processor **210** may identify an image **651**, based on synthesizing an image **614** obtained within a time interval **604** and the image **613**. The processor **210** may set the image **651** as a frame **650-4**. The processor **210** may store the image **651** in the buffer of the memory **230**.
[0125] According to an embodiment, the processor **210** may identify an image **652**, based on synthesizing an image **615** obtained within a time interval **605** and the image **651**. The processor **210** may set the image **652** as a frame **650-5**. The processor **210** may store the image **652** in the buffer of the memory **230**.
[0126] According to an embodiment, the processor **210** may obtain an image **616** within a time interval **606**. The processor **210** may identify a brightness value for the image **616**. The processor **210** may identify that the brightness value for the image **616** is greater than or equal to a designated brightness value. The processor **210** may reset the image synthesis process, based on identifying that the brightness value for the image **616** is greater than or equal to the designated brightness value. The processor **210** may set the image **616** as a frame **650-6**. The processor **210** may store the image **616** in the buffer of the memory **230**.
[0127] According to an embodiment, the processor **210** may reset the image synthesis process based on identifying that a brightness value for an obtained image is greater than or equal to a designated brightness value. By resetting the image synthesis process, the processor **210** may identify the plurality of frames **650**, by performing the image synthesis process from the obtained image.
[0128] FIGS. **7**A and **7**B illustrate an example of an operation of an electronic device according to various embodiments of the disclosure. Operations of FIGS. **7**A and **7**B may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.
[0129] Referring to FIG. **7**A, in a state **700-1**, the processor **210** may set an exposure time of the camera **220** as a time interval **701**. For example, the time interval **701** may be less than a maximum exposure time of the camera **220**. The processor **210** may obtain an image **710-1** by processing data obtained during the time interval **701**, at a time interval **702**. The processor **210** may set the image **710-1** as a first frame among a plurality of frames. The processor **210** may configure one frame during a time interval **703**. As in operation of FIG. **6**A, the processor **210** may obtain an image **710-2** by synthesizing the image **710-1** and a newly obtained image. The processor **210** may identify an image **710-**n by accumulating and synthesizing obtained images.
[0130] According to an embodiment, the image **710-**n may include a visual object **711** indicating a trajectory of an external object. The trajectory of the external object may not be continuously displayed in the visual object **711**.

[0131] Referring to FIG. **7**B, in a state **700-2**, the processor **210** may set an exposure time of the camera **220** as a time interval **704**. For example, the time interval **704** may be a maximum exposure time of the camera **220** identified based on capability information of an image sensor of the camera **220**. The processor **210** may obtain an image **720-1** by processing data obtained during the time interval **704**, at a time interval **705**. The processor **210** may set the image **720-1** as a first frame among a plurality of frames. The processor **210** may configure one frame during the time interval **703**. As in operation of FIG. **6**A, the processor **210** may obtain an image **720-2** by synthesizing the image **720-1** and a newly obtained image. The processor **210** may identify an image **720-**n by accumulating and synthesizing obtained images.
[0132] According to an embodiment, the image **720-**n may include a visual object **721** indicating a trajectory of an external object. The trajectory of the external object may be continuously displayed in the visual object **721**.
[0133] Referring to FIGS. **7**A and **7**B, the processor **210** may differently set the exposure time of the camera **220**, within the same time interval **703**. When the exposure time of the camera **220** is set to the maximum exposure time of the camera **220**, the processor **210** may obtain an image (e.g., the image **720-**n) in which a trajectory of an external object (e.g., a star) is continuously displayed.
[0134] According to an embodiment, the processor **210** may identify the maximum exposure time of the camera **220**, based on capability information of an image sensor included in the camera **220**. In addition, the processor **210** may set a time for processing data obtained during an exposure time of the camera **220** to a minimum time. For example, the processor **210** may set the exposure time of the camera **220** to the maximum exposure time, and set a time for processing data obtained during the exposure time of the camera **220** to the minimum time. In this case, the processor **210** may identify an image in which a trajectory of an external object is continuously displayed.
[0135] FIG. **8** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **8** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **810** to **830** may be related to operation **440** of FIG. **4**.
[0136] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.
[0137] Referring to FIG. **8**, in operation **810**, the processor **210** may identify that a first image includes a first visual object. For example, the processor **210** may identify that the first image includes the first visual object, corresponding to an external object (e.g., a star) and disposed in a first position within the first image.
[0138] According to an embodiment, the processor **210** may identify a first visual object corresponding to an external object (e.g., a star) among a plurality of visual objects included in the first image. An example of a specific operation of identifying the first visual object among a plurality of visual objects included in the first image will be described later with reference to FIGS. **11** and **12**.
[0139] In operation **820**, the processor **210** may identify that a second image includes a second visual object. For example, the processor **210** may identify that the second image includes a second visual object, corresponding to an external object (e.g., a star) and disposed in a second position within the second image.
[0140] According to an embodiment, the processor **210** may identify that an external object (e.g., a star) moves over time. For example, the external object may be identified as being moved based on a rotation of the Earth. Although an absolute position of the external object is not changed, it may be identified as the external object being moved by the rotation of the Earth. Hereinafter, for convenience of description, it may be described that an external object is moved based on an observer (or an electronic device).
[0141] For example, while a camera (e.g., the camera **220** of FIG. **2**) (or the electronic device **200**

of FIG. **2**) is fixed and photographs a fixed external area, an external object may move over time. Therefore, a position of the first visual object corresponding to the external object in the first image may be different from a position of the second visual object corresponding to the external object in the second image.

[0142] In operation **830**, the processor **210** may obtain a third image including the first visual object and the second visual object. For example, the processor **210** may obtain the third image including the first visual object and the second visual object, based on synthesizing the first image and the second image.

[0143] According to an embodiment, the processor **210** may obtain a third image including both the first visual object and the second visual object. For example, the processor **210** may obtain a third image including only the first visual object and the second visual object.

[0144] According to an embodiment, the processor **210** may remove, from the third image, remaining visual objects excluding the first visual object among a plurality of visual objects included in the first image and remaining visual objects excluding the second visual object among a plurality of visual objects included in the second image. The processor **210** may obtain the third image by removing visual objects that do not correspond to the external object, in order to represent only the trajectory of the external object.

[0145] FIG. **9** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **9** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **901** to **908** may be related to an operation of synthesizing a first image and a second image to represent a trajectory of an external object.

[0146] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.

[0147] Referring to FIG. **9**, in operation **901**, the processor **210** may identify a first visual object corresponding to an external object in a first image. For example, the processor **210** may identify a plurality of visual objects included in the first image. The processor **210** may identify the first visual object corresponding to an external object, based on a plurality of visual objects included in the first image. A detailed operation of the processor **210** for identifying a visual object corresponding to an external object in an image will be described later with reference to FIGS. **11** and **12**.

[0148] In operation **902**, the processor **210** may identify whether a second image is stored in a buffer. For example, by identifying whether the second image is stored in the buffer, the processor **210** may identify whether the first image is obtained to configure a first frame among a plurality of frames constituting video data. For example, the processor **210** may identify whether the first image is obtained after a video synthesis process is reset, by identifying whether the second image is stored in the buffer.

[0149] In operation **903**, when the second image is not stored in the buffer (operation **902**-NO), the processor **210** may store the first image in the buffer. For example, the processor **210** may store the first image in the buffer, based on identifying that the second image is not stored in the buffer of the memory **230**. For example, the processor **210** may configure the first image as one frame of a plurality of frames constituting video data.

[0150] In operation **904**, when the second image is stored in the buffer (operation **902**-YES), the processor **210** may identify whether a synthesis of the first visual object and the second visual object is required. For example, the processor **210** may identify whether a synthesis of the first visual object and the second visual object is required based on identifying that the second image is stored in the buffer.

[0151] For example, based on identifying that a brightness value of the first image is greater than or equal to a designated brightness value, the processor **210** may identify that a trajectory of an external object is not represented according to the synthesis of the first visual object and the second visual object. Accordingly, the processor **210** may identify whether a synthesis of the first visual object and the second visual object is required, based on the brightness value of the first image.

[0152] For example, the processor **210** may separate the first image into a luminance channel and a chroma channel. The processor **210** may identify whether a synthesis of the first visual object and the second visual object is required, based on a value related to the luminance of the first image according to the luminance channel. For example, the luminance channel may indicate information on a brightness difference of the first image. For example, the chroma channel may indicate information on a color difference of the first image in the first image.

[0153] For example, the processor **210** may identify whether a trajectory of an external object is represented according to the synthesis of the first visual object and the second visual object. Even when it is identified that the first visual object corresponds to an external object (e.g., a star), the first visual object may not actually correspond to the external object. Therefore, the processor **210** may identify whether the synthesis of the first visual object and the second visual object is required by comparing a feature of the first visual object and a feature of the second visual object (e.g., size, shape, or position).

[0154] For example, the processor **210** may identify whether a synthesis of the first visual object and the second visual object is required, based on comparing a size of the first visual object and a size of the second visual object. For example, based on comparing a first position of the first visual object within the first image and a second position of the second visual object within the second image, the processor **210** may identify whether the synthesis of the first visual object and the second visual object is required.

[0155] In operation **905**, when the synthesis of the first visual object and the second visual object is required (operation **904**-YES), the processor **210** may reduce a brightness value of the second visual object according to a first ratio.

[0156] For example, the processor **210** may reduce a brightness value of the second visual object of the second image, which is obtained before the first image, to represent the trajectory of the external object. The processor **210** may reduce the brightness value of the second visual object according to the first ratio.

[0157] In operation **906**, when the synthesis of the first visual object and the second visual object is not required (operation **904**-NO), the processor **210** may reduce the brightness value of the second visual object according to a second ratio.

[0158] For example, the second ratio may be set to be greater than the first ratio. The processor **210** may reduce the brightness value of the second visual object of the second image, which is obtained before the first image, according to a ratio relatively greater than the brightness value of the first visual object. When the trajectory of the external object is not represented according to the synthesis of the first visual object and the second visual object, the processor **210** may exclude the second visual object and synthesize the first image and the second image. Accordingly, the processor **210** may reduce the brightness value of the second visual object according to the second ratio greater than the first ratio.

[0159] In operation **907**, the processor **210** may synthesize the first image and the second image. For example, according to operation **905**, the processor **210** may synthesize the first image and the second image after reducing the brightness value of the first visual object in the first image according to the first ratio. For example, according to operation **906**, the processor **210** may synthesize the first image and the second image after reducing the brightness value of the second visual object in the second image according to the second ratio.

[0160] In operation **908**, the processor **210** may obtain a third image. For example, the processor **210** may obtain the third image, based on synthesizing the first image and the second image. For example, the third image may include the first visual object and the second visual object. A brightness value of the second visual object included in the third image may be in a state that it is reduced by the first ratio or the second ratio compared to the brightness value of the second visual

object included in the second image.
[0161] According to an embodiment, the processor **210** may separate the first image into a luminance channel and a chroma channel. The processor **210** may separate the second image into a luminance channel and a chroma channel. The processor **210** may identify a synthesis ratio based on a first value indicating the luminance of the first image and a second value indicating the luminance of the second image. The processor **210** may synthesize a luminance channel of the first image and a luminance channel of the second image, based on the identified synthesis ratio. The processor **210** may synthesize a chroma channel of the first image and a chroma channel of the second image, based on the identified synthesis ratio. According to an embodiment, the synthesis ratio for synthesizing the chroma channel of the first image and the chroma channel of the second image may be set differently from the synthesis ratio for synthesizing the luminance channel of the first image and the luminance channel of the second image.
[0162] FIG. **10** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **10** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.
[0163] Referring to FIG. **10**, the processor **210** may obtain an image **1010**. The image **1010** may include visual objects **1011** to **1015**. For example, the processor **210** may identify that visual objects **1011** to **1015** all correspond to stars. Even when only visual objects **1011** to **1013** actually corresponds to a star, the processor **210** may identify that visual objects **1011** to **1015** all correspond to a star. As an example, the visual object **1014** may actually correspond to light of a building. The visual object **1015** may actually correspond to light of a street tree.
[0164] According to an embodiment, the processor **210** may obtain an image **1020**. For example, the processor **210** may obtain the image **1020** after obtaining the image **1010**. As time elapses, a position of a visual object corresponding to the star in the image **1020** may change.
[0165] For example, the processor **210** may identify that the position of the visual objects **1021** to **1023** in the image **1020** are changed based on the position of the visual objects **1011** to **1013** in the image **1010**. The processor **210** may identify that the visual object **1011** and the visual object **1021** correspond to the same star. The processor **210** may synthesize the visual object **1011** and the visual object **1021**. The processor **210** may identify that the visual object **1012** and the visual object **1022** correspond to the same star. The processor **210** may synthesize the visual object **1012** and the visual object **1022**. The processor **210** may identify that the visual object **1013** and the visual object **1023** correspond to the same star. The processor **210** may synthesize the visual object **1013** and the visual object **1023**.
[0166] For example, the processor **210** may identify that the position of the visual object **1024** in the image **1020** is identical to the position of the visual object **1014** in the image **1010**. The processor **210** may identify that the position of the visual object **1025** in the image **1020** is identical to the position of the visual object **1015** in the image **1010**. The processor **210** may identify that the visual object **1024** and the visual object **1025** do not correspond to the star. The processor **210** may not synthesize the visual object **1014** and the visual object **1024**. The processor **210** may not synthesize the visual object **1015** and the visual object **1025**.
[0167] According to an embodiment, the processor **210** may synthesize the image **1010** and the image **1020**. The processor **210** may obtain an image **1030** by synthesizing the image **1010** and the image **1020**. The image **1030** may include visual objects **1031** to **1035**.
[0168] For example, the processor **210** may obtain a visual object **1031**, based on synthesizing the visual object **1011** and the visual object **1021**. The processor **210** may obtain a visual object **1032** based on synthesizing the visual object **1012** and the visual object **1022**. The processor **210** may obtain a visual object **1033** based on synthesizing the visual object **1013** and the visual object **1023**.
[0169] For example, the processor **210** may not synthesize the visual object **1014** and the visual object **1024**. The processor **210** may configure a visual object **1034** to correspond to the visual object **1024**. The processor **210** may not synthesize the visual object **1015** and the visual object

1025. The processor **210** may configure a visual object **1035** to correspond to the visual object **1025**.

[0170] Unlike the illustration, an image **1030** in which the image **1010** and the image **1020** are synthesized may not include the visual object **1034** and the visual object **1035**. The processor **210** may configure the image **1030** to include only the trajectory of the star. For example, the image **1030** may include only the visual objects **1031** to **1033**. As an example, the processor **210** may perform a synthesis of the image **1010** and the image **1020** in a state of excluding the visual object **1014**, the visual object **1015**, the visual object **1024**, and the visual object **1025**.

[0171] FIG. **11** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **11** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **1110** and **1120** may be related to an operation of identifying a first visual object corresponding to an external object among a plurality of visual objects included in a first image.

[0172] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.

[0173] Referring to FIG. **11**, in operation **1110**, the processor **210** may identify a shape and a brightness value of each of a plurality of visual objects included in the first image. For example, the processor **210** may identify a plurality of visual objects of the first image. The processor **210** may identify a shape and a brightness value of each of the plurality of visual objects.

[0174] In operation **1120**, the processor **210** may identify a first visual object satisfying a designated condition from among the plurality of visual objects. For example, the processor **210** may identify the first visual object satisfying the designated condition from among the plurality of visual objects, based on a shape and a brightness value of each of the plurality of visual objects.

[0175] According to an embodiment, the processor **210** may identify a candidate visual object that is one of the plurality of visual objects. Based on identifying that the candidate visual object satisfies the designated condition, the processor **210** may identify the candidate visual object as the first visual object corresponding to an external object.

[0176] For example, the processor **210** may identify a brightness value of the candidate visual object. The processor **210** may identify a brightness value of the candidate visual object, based on a brightness value of at least one pixel constituting the candidate visual object. The processor **210** may identify whether the brightness value of the candidate visual object is within a first range. Based on identifying that the brightness value of the candidate visual object is within the first range, the processor **210** may identify the candidate visual object as a first visual object corresponding to an external object (e.g., a star).

[0177] For example, the processor **210** may identify a shape of the candidate visual object. The processor **210** may identify an aspect ratio in the shape of the candidate visual object. The processor **210** may identify whether the aspect ratio in the shape of the candidate visual object is within a second range. Based on identifying that the aspect ratio in the shape of the candidate visual object is within the second range, the processor **210** may identify the candidate visual object as a first visual object corresponding to an external object (e.g., a star).

[0178] FIG. **12** is a flowchart illustrating an operation of an electronic device, according to an embodiment of the disclosure. Operations of FIG. **12** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**. Operations **1201** and **1206** may be related to an operation of identifying a first visual object corresponding to an external object among a plurality of visual objects included in a first image.

[0179] Referring to FIG. **12**, in operation **1201**, the processor **210** may identify a candidate visual object among a plurality of visual objects in the first image. For example, the processor **210** may set one of the plurality of visual objects in the first image as a candidate visual object. For example, the processor **210** may sequentially set a plurality of visual objects as candidate visual objects.

[0180] In operation **1202**, the processor **210** may identify whether a brightness value of the candidate visual object is within a first range. For example, the processor **210** may identify a brightness value of at least one pixel constituting the candidate visual object. The processor **210** may identify a brightness value of the candidate visual object based on the brightness value of the at least one pixel. As an example, the processor **210** may identify a representative value (e.g., a maximum value, a minimum value, an intermediate value, a mode value, or an average value) of brightness values of at least one pixel as a brightness value of a candidate visual object. As an example, the processor **210** may identify an intermediate value of brightness values of at least one pixel as a brightness value of the candidate visual object.
[0181] For example, a brightness value of a visual object corresponding to an external object (e.g., a star) may be within the first range. As an example, the processor **210** may identify that the candidate visual object corresponds to the external object, based on identifying that the brightness value of the candidate visual object is within the first range.
[0182] According to an embodiment, when the brightness value of the candidate visual object is out of the first range (operation **1202**-NO), the processor **210** may perform operation **1201**. The processor **210** may identify another candidate visual object among the plurality of visual objects in the first image, based on identifying that the brightness value of the candidate visual object is out of the first range. The processor **210** may perform operations **1202** to **1206**, based on identifying other candidate visual objects.
[0183] In operation **1203**, when the brightness value of the candidate visual object is within the first range (operation **1202**-YES), the processor **210** may identify whether an aspect ratio of a shape of the candidate visual object is within a second range. For example, the processor **210** may identify whether the aspect ratio of the shape of the candidate visual object is within the second range, based on identifying that the brightness value of the candidate visual object is within the first range. For example, the second range may be set to 0.8 to 1.2.
[0184] For example, an aspect ratio of a shape of a visual object corresponding to an external object (e.g., a star) may be within a second range. As an example, the processor **210** may identify that the candidate visual object corresponds to the external object, based on identifying that the aspect ratio of the shape of the visual object is within the second range.
[0185] According to an embodiment, when the aspect ratio of the shape of the candidate visual object is out of the second range (operation **1203**-NO), the processor **210** may perform operation **1201**. The processor **210** may identify another candidate visual object among the plurality of visual objects in the first image, based on identifying that the aspect ratio of the shape of the candidate visual object is out of the second range. The processor **210** may perform operations **1202** to **1206**, based on identifying other candidate visual objects.
[0186] In operation **1204**, when the aspect ratio of the shape of the candidate visual object is within the second range (operation **1203**-YES), the processor **210** may identify whether the shape of the candidate visual object corresponds to a designated shape. For example, the processor **210** may identify whether the shape of the candidate visual object corresponds to the designated shape, based on identifying that the aspect ratio of the shape of the candidate visual object is within the second range. The designated shape may be set to one of a circle, a square, an ellipse, a rectangle, and a short straight line. According to an embodiment, the designated shape may be set based on an exposure time. For example, when the exposure time is set to a first time interval (e.g., 5 seconds), the designated shape may be set to a circle or a rectangle. For example, when the exposure time is set to a second time interval (e.g., 10 to 15 seconds), the designated shape may be set to one of an ellipse, a rectangle, or a short straight line.
[0187] For example, a shape of a visual object corresponding to an external object (e.g., a star) may correspond to the designated shape. As an example, the processor **210** may identify that the candidate visual object corresponds to the external object, based on the shape of the candidate visual object corresponding to the designated shape.

[0188] According to an embodiment, when the shape of the candidate visual object does not correspond to the designated shape (operation **1204**-NO), the processor **210** may perform operation **1201**. Based on identifying that the shape of the candidate visual object does not correspond to the designated shape, the processor **210** may identify another candidate visual object among the plurality of visual objects in the first image. The processor **210** may perform operations **1202** to **1206** based on identifying other candidate visual objects.
[0189] In operation **1205**, when the shape of the candidate visual object corresponds to the designated shape (operation **1204**-YES), the processor **210** may identify whether a brightness value of a central portion of the shape of the candidate visual object is greater than a brightness value of an outer portion of the shape of the candidate visual object. For example, based on identifying that the shape of the candidate visual object corresponds to the designated shape, the processor **210** may identify whether the brightness value of the central portion of the shape of the candidate visual object is greater than the brightness value of the outer portion of the shape of the candidate visual object.
[0190] For example, a brightness value of a central portion of a shape of a visual object corresponding to an external object (e.g., a star) may be greater than a brightness value of an outer portion. For example, the processor **210** may identify that the candidate visual object corresponds to the external object, based on identifying that the brightness value of the central portion of the shape of the candidate visual object is greater than the brightness value of the outer portion.
[0191] According to an embodiment, when the brightness value of the central portion of the shape of the candidate visual object is less than or equal to the brightness value of the outer portion of the shape of the candidate visual object (operation **1205**-NO), the processor **210** may perform operation **1201**. Based on identifying that the brightness value of the central portion of the shape of the candidate visual object is less than or equal to the brightness value of the outer portion of the shape of the candidate visual object, the processor **210** may identify another candidate visual object among the plurality of visual objects in the first image. The processor **210** may perform operations **1202** to **1206**, based on identifying other candidate visual objects.
[0192] In operation **1206**, when the brightness value of the central portion of the shape of the candidate visual object is greater than the brightness value of the outer portion of the shape of the candidate visual object (operation **1205**-YES), the processor **210** may identify the candidate visual object as a first visual object corresponding to the external object. For example, the processor **210** may identify the candidate visual object as the first visual object corresponding to the external object, based on identifying that the brightness value of the central portion of the shape of the candidate visual object is greater than the brightness value of the outer portion of the shape of the candidate visual object.
[0193] Operations **1202** to **1205** are illustrated to be performed sequentially, but are not limited thereto. A sequence of operations **1202** to **1205** may be changed, and operations **1202** to **1205** may be performed in parallel (or simultaneously).
[0194] FIGS. **13**A and **13**B illustrate an example of an operation of an electronic device according to various embodiments of the disclosure. Operations of FIGS. **13**A and **13**B may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.
[0195] Referring to FIG. **13**A, the processor **210** may identify an image **1310**. The processor **210** may identify an image **1310** that is a portion of the obtained first image. The processor **210** may identify an image **1310**, which includes a candidate visual object included in the first image and is a portion of the first image. For example, the processor **210** may identify the image **1310** of a designated size (e.g., 17×16 pixels). According to an embodiment, the processor **210** may change the specified size based on a zoom magnification and a resolution size. For example, the processor **210** may identify an image of a designated size (e.g., 30×30 pixels), based on 1× zoom and ultra high definition (UHD) resolution.
[0196] According to an embodiment, the image **1310** may include a plurality of pixels. The

processor **210** may identify brightness values of the plurality of pixels. The processor **210** may identify the brightness value of the plurality of pixels as one of 0 to 255. As the pixel becomes brighter, the processor **210** may set a larger brightness value of the pixel. Each of grids of the image **1310** may mean a pixel. A number in the grids may mean a brightness value of a pixel.

[0197] According to an embodiment, the image **1310** may include a candidate visual object **1311**. The candidate visual object **1311** may be configured with at least one pixel in the image **1310**. The processor **210** may identify the candidate visual object **1311** based on the brightness value of the plurality of pixels.

[0198] A brightness value of a visual object (or a central portion or an outer portion) described below may mean a representative value of brightness values of at least one pixel constituting the visual object (or the central portion or the outer portion). For example, a representative value of the brightness values of the at least one pixel constituting the visual object (or the central portion or the outer portion) may be one of a maximum value, a minimum value, an intermediate value, a mode value, or an average value of the brightness values of the at least one pixel constituting the visual object (or the central portion or the outer portion). According to an embodiment, the processor **210** may identify information on a feature of the candidate visual object **1311**. For example, the processor **210** may identify a brightness value of the candidate visual object **1311**. For example, the processor **210** may identify an aspect ratio of a shape of the candidate visual object **1311**. For example, the processor **210** may identify whether the shape of the candidate visual object **1311** corresponds to a designated shape. For example, the processor **210** may identify whether a brightness value of a central portion **1312** in the shape of the candidate visual object **1311** is greater than a brightness value of an outer portion **1313**. For example, the brightness value of the central portion **1312** may mean a representative value (e.g., a maximum value, a minimum value, an intermediate value, a mode value, or an average value) of brightness values of pixels corresponding to the central portion **1312**. For example, a brightness value of the outer portion **1313** may mean a representative value (e.g., a maximum value, a minimum value, an intermediate value, a mode value, or an average value) of brightness values of pixels corresponding to the outer portion **1313**. For example, the processor **210** may identify that the candidate visual object **1311** satisfies a first condition, based on identifying that the brightness value of the candidate visual object **1311** is within a first range. For example, the processor **210** may identify that the candidate visual object **1311** satisfies a second condition, based on identifying that the aspect ratio of the shape of the candidate visual object **1311** is within a second range. For example, the processor **210** may identify that the candidate visual object **1311** satisfies a third condition, based on identifying that a shape of the candidate visual object **1311** corresponds to a designated shape. For example, based on identifying that a brightness value of the central portion **1312** of the shape of the candidate visual object **1311** is greater than a brightness value of the outer portion **1313**, the processor **210** may identify that the candidate visual object **1311** satisfies a fourth condition.

[0199] Based on identifying that the candidate visual object **1311** satisfies all of the first to fourth conditions, the processor **210** may identify the candidate visual object **1311** as a first visual object corresponding to an external object (e.g., a star). According to an embodiment, the processor **210** may also identify the candidate visual object **1311** as a first visual object corresponding to an external object (e.g., a star), based on identifying that the candidate visual object **1311** satisfies at least a portion of the first to fourth conditions.

[0200] Referring to FIG. **13**B, the processor **210** may identify an image **1320**. The processor **210** may identify the image **1320** that is a portion of the obtained first image. The processor **210** may identify the image **1320**, which includes a candidate visual object included in the first image and is a portion of the first image.

[0201] According to an embodiment, the processor **210** may identify information on a feature of a candidate visual object **1321**. For example, the processor **210** may identify a brightness value of the candidate visual object **1321**. For example, the processor **210** may identify an aspect ratio of a shape of the candidate visual object **1321**. For example, the processor **210** may identify whether the shape of the candidate visual object **1321** corresponds to a designated shape. For example, the processor **210** may identify whether a brightness value of a central portion **1322** in the shape of the candidate visual object **1321** is greater than a brightness value of an outer portion **1323**.

[0202] For example, the processor **210** may identify whether the candidate visual object **1321** satisfies a first condition, based on identifying whether a brightness value of the candidate visual object **1321** is within a first range. For example, the processor **210** may identify whether the candidate visual object **1321** satisfies a second condition, based on identifying whether the aspect ratio of the shape of the candidate visual object **1321** is within a second range. For example, the processor **210** may identify whether the candidate visual object **1321** satisfies a third condition, based on identifying whether the shape of the candidate visual object **1321** corresponds to a designated shape. For example, based on identifying whether a brightness value of the central portion **1322** of the shape of the candidate visual object **1321** is greater than the brightness value of the outer portion **1323**, the processor **210** may identify whether the candidate visual object **1321** satisfies the fourth condition.

[0203] According to an embodiment, the processor **210** may identify that the candidate visual object **1321** does not correspond to the external object, based on identifying that the candidate visual object **1321** does not satisfy at least one of the first to fourth conditions. According to an embodiment, the processor **210** may identify that the candidate visual object **1321** does not correspond to an external object (e.g., a star), based on identifying that the candidate visual object **1321** does not satisfy at least a portion of the first to fourth conditions.

[0204] FIG. **14** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **14** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.

[0205] In the following embodiment, each operation may be performed sequentially, but is not necessarily performed sequentially. For example, the sequence of each operation may be changed, and at least two operations may be performed in parallel.

[0206] Referring to FIG. **14**, in operation **1410**, the processor **210** may identify that a size of a first visual object corresponds to a size of a second visual object. For example, the first visual object may be included in a first image obtained. The second visual object may be included in a pre-synthesized second image. For example, the first visual object may indicate a current external object. The second visual object may indicate a trajectory of the external object over time.

[0207] According to an embodiment, the first visual object may be configured in a circular shape. The second visual object may be configured in an ellipse. The processor **210** may identify a diameter of the first visual object configured in a circular shape as a size of the first visual object. The processor **210** may identify a minor axis among a major axis and the minor axis of a second visual object configured in an ellipse as a size of the second visual object. Based on identifying that a length of the diameter of the first visual object corresponds to a length of the minor axis of the second visual object, the processor **210** may identify that the size of the first visual object corresponds to the size of the second visual object.

[0208] According to an embodiment, the first visual object may correspond to an external object and may be disposed at a first position in the first image. The second visual object may correspond to an external object and may be disposed at a second position in the second image.

[0209] According to an embodiment, the processor **210** may identify that the first visual object corresponds to the external object, based on identifying that a size of the first visual object corresponds to a size of the second visual object.

[0210] In operation **1420**, the processor **210** may identify that a distance between the first position and the second position is less than or equal to a designated distance. For example, the processor **210** may identify that the distance between the first position and the second position is less than or equal to the designated distance, based on identifying that the size of the first visual object corresponds to the size of the second visual object.

[0211] For example, a position of an external object (e.g., a star) may be changed over time. The processor **210** may identify movement of the external object by identifying a distance between the first position and the second position. The processor **210** may identify the designated distance, which is a distance at which a visual object indicating an external object is movable within the image for a designated time. Based on identifying that the distance between the first position and the second position is less than or equal to the designated distance, the processor **210** may identify that the first visual object and the second visual object correspond to the external object.

[0212] In operation **1430**, the processor **210** may obtain a third image including the first visual object and the second visual object. For example, the processor **210** may obtain the third image including the first visual object and the second visual object, based on identifying that the distance between the first position and the second position is less than or equal to the designated distance.

[0213] According to an embodiment, the processor **210** may synthesize the first image and the second image, based on an alpha blending algorithm. For example, a brightness value of a first visual object included in the third image may be set to be greater than a brightness value of a second visual object included in the third image. For example, the processor **210** may obtain the third image, based on the alpha blending algorithm, by changing a brightness value of the first visual object included in the first image according to a first ratio (e.g., a), changing a brightness value of the second visual object included in the second image according to a second ratio (e.g., 1-a), and synthesizing the first visual object and the second visual object changed according to the first ratio and the second ratio.

[0214] FIG. **15** illustrates an example of an operation of an electronic device according to an embodiment of the disclosure. Operations for obtaining images in FIG. **15** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.

[0215] Referring to FIG. **15**, the processor **210** may obtain images **1510** to **1530**. For example, the processor **210** may sequentially obtain images **1510** to **1530**.

[0216] According to an embodiment, the processor **210** may obtain an image **1510**. The image **1510** may include a visual object **1511** corresponding to an external object (e.g., a star). The processor **210** may obtain an image **1520** after obtaining the image **1510**. The image **1520** may include a visual object **1521** corresponding to an external object. The processor **210** may obtain an image **1530** after obtaining the image **1520**. The image **1530** may include a visual object **1531** corresponding to an external object.

[0217] According to an embodiment, the processor **210** may synthesize the images **1510** to **1530**. The processor **210** may obtain an image **1540** based on synthesizing the images **1510** to **1530**. For example, the processor **210** may synthesize only visual objects **1511** to **1531** corresponding to the external object from among objects included in the images **1510** to **1530**. The processor **210** may obtain the visual object **1541** based on synthesizing the visual objects **1511** to **1531**. The processor **210** may obtain an image **1540** including a visual object **1541**. For example, the visual object **1541** may indicate a trajectory of an external object.

[0218] According to an embodiment, the processor **210** may obtain an image **1550** indicating that the external object moves over time. For example, the processor **210** may synthesize the images **1510** to **1530**, based on the alpha blending algorithm. For example, the processor **210** may change a brightness value of the visual object **1511** according to a first ratio. The processor **210** may change a brightness value of the visual object **1521** according to a second ratio. The processor **210** may change a brightness value of the visual object **1531** according to a third ratio. The third ratio may be set to be greater than the second ratio. The second ratio may be set to be greater than the first ratio. As an example, a sum of the first to third ratios may be set to 1.

[0219] The processor **210** may change the brightness value of the visual objects **1511** to **1531** according to the above-described ratios and synthesize the visual objects **1511** to **1531**. The processor **210** may obtain a visual object **1551** based on synthesizing the visual objects **1511** to

1531. The visual object **1551** may indicate a trajectory of an external object. For example, the visual object **1551** may set a brightness value of a portion indicating the previous trajectory to be low. The processor **210** may synthesize (or blend) a plurality of images so that previous trajectories in the video data become gradually darker over time.

[0220] According to an embodiment, the processor **210** may configure the image **1550** as one of a plurality of frames constituting video data. The processor **210** may identify video data by configuring a plurality of frames according to the above-described operation. For example, the processor **210** may identify that movement of a visual object included in an image constituting one frame does not occur. The processor **210** may change a weight (e.g., blending weight) for synthesis so that the trajectory of the external object may quickly disappear as the video data is played.

[0221] FIG. **16** is a flowchart illustrating an operation of an electronic device according to an embodiment of the disclosure. Operations of FIG. **16** may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.

[0222] Referring to FIG. **16**, operations **1601**, **1602**, **1603**, **1604** and **1605** may correspond to operations **501** to **505** of FIG. **5**, respectively.

[0223] In operation **1606**, the processor **210** may identify whether a reset of an image synthesis process is required. Operation **1606** may correspond to operation **506** of FIG. **5**.

[0224] According to an embodiment, the processor **210** may identify whether two or more images immediately before an image is obtained have been consecutively skipped. The processor **210** may identify whether a reset of the image synthesis process is required, based on identifying whether two or more images immediately before an image is obtained have been consecutively skipped.

[0225] In operation **1607**, when a frame counter is 0, or a reset of image synthesis process is required, the processor **210** may store the obtained image in a buffer. Operation **1607** may correspond to operation **507**.

[0226] In operation **1608**, when a reset of the image synthesis process is not required, the processor **210** may identify whether a skip of the obtained image is required. For example, the processor **210** may identify whether a skip of the obtained image is required, based on identifying that a reset of the image synthesis process is not required.

[0227] For example, the processor **210** may identify whether a skip of the obtained image is required, based on identifying whether a brightness value of the obtained image is greater than or equal to a designated brightness value. For example, the processor **210** may identify whether a skip of the obtained image is required, based on identifying whether movement of the electronic device **200** has occurred while obtaining the image. For example, the processor **210** may identify whether a skip of the obtained image is required, based on identifying whether the electronic device **200** moves and then returns to an original position, while the image is being obtained.

[0228] In operation **1609**, when a skip of the obtained image is required, the processor **210** may maintain an image stored in the buffer. For example, the processor **210** may not synthesize the obtained image with the image stored in the buffer.

[0229] According to an embodiment, based on identifying that a skip of the obtained image is required, the processor **210** may synthesize the obtained image with the image stored in the buffer. However, the processor **210** may not store the synthesized image in the buffer.

[0230] For example, the processor **210** may identify that a skip of the obtained image is required, based on identifying whether a brightness value of the obtained image is greater than or equal to a designated brightness value. The processor **210** may maintain the image stored in the buffer, based on identifying that a skip of the obtained image is required. Based on identifying that a skip of the obtained image is required, the processor **210** may synthesize the obtained image with the image stored in the buffer. However, the processor **210** may not store the synthesized image in the buffer.

[0231] For example, the processor **210** may identify that the electronic device **200** moves and then returns to the original position while the image is being obtained. The Processor **210** may identify that a skip of the obtained image is required. The processor **210** may maintain the image stored in the buffer, based on identifying that a skip of the obtained image is required. The processor **210** may synthesize the obtained image with the image stored in the buffer, based on identifying that a skip of the obtained image is required. However, the processor **210** may not store the synthesized image in the buffer.

[0232] In operation **1610**, when a skip of the obtained image is not required, the processor **210** may synthesize the image stored in the buffer and the obtained image. The processor **210** may synthesize the image stored in the buffer and the obtained image, based on identifying that a skip of the obtained image is not required. Operation **1610** may correspond to operation **508** of FIG. **5**.

[0233] Operations **1611**, **1612**, **1613**, **1614**, **1615** and **1616** may correspond to operations **509** to **513** of FIG. **5**.

[0234] FIG. **17**A illustrates an example of an operation of an electronic device according to an embodiment of the disclosure.

[0235] FIG. **17**B illustrates an example of an operation of an electronic device according to an embodiment of the disclosure.

[0236] FIG. **17**A illustrates an example in which a plurality of frames **1730** are obtained in a state in which an image **1713** is not skipped, when movement of the electronic device **200** occurs. FIG. **17**B illustrates an example in which a plurality of frames **1760** are obtained in a state in which an image **1753** is skipped, when movement of the electronic device **200** occurs. Operations according to FIGS. **17**A and **17**B may be performed by the processor **210** of the electronic device **200** illustrated in FIG. **2**.

[0237] Referring to FIG. **17**A, the processor **210** may obtain an image **1711** within a time interval **1701**. The processor **210** may set the image **1711** as a frame **1730-1** which is a first frame among the plurality of frames **1730**. The processor **210** may store the image **1711** in a buffer of memory (e.g., the memory **230** of FIG. **2**).

[0238] The processor **210** may obtain an image **1712** within a time interval **1702**. The processor **210** may obtain an image **1722** by synthesizing the image **1711** stored in the buffer and the image **1712**. The processor **210** may set the image **1722** as a frame **1730-2** which is a second frame among the plurality of frames **1730**. The processor **210** may store the image **1722** in the buffer of the memory **230**.

[0239] The processor **210** may obtain an image **1713** within a time interval **1703**. For example, while the image **1713** is obtained, movement of the electronic device **200** may occur. As an example, while the processor **210** obtains the image **1713**, the electronic device **200** may move and then return to an original position. A position of a visual object corresponding to an external object (e.g., a star) included in the image **1713** may be different from a position when the electronic device **200** does not move.

[0240] The processor **210** may obtain an image **1723** by synthesizing the image **1722** stored in the buffer and the image **1713**. The processor **210** may set the image **1723** as a frame **1730-3** which is a third frame among the plurality of frames **1730**. The processor **210** may store the image **1723** in the buffer of the memory **230**.

[0241] The processor **210** may identify (or obtain) the plurality of frames **1730** consisting of a plurality of images including the image **1711**, the image **1722**, the image **1723**, and an image **1724** by repeating the above-described operation. The processor **210** may obtain video data consisting of the plurality of frames **1730**, and store the obtained video data in the memory **230**.

[0242] According to an embodiment, the processor **210** may accumulate and synthesize a plurality of images, and set the synthesized image as one of a plurality of frames constituting video data. The processor **210** may represent a trajectory of an external object through video data, by setting the synthesized image as one of the plurality of frames constituting video data.

[0243] For example, as movement of the electronic device **200** occurs while obtaining the image **1713**, the trajectory of the external object may be represented differently from an actual trajectory. As an example, after the image **1713** is obtained, one of a plurality of frames may be obtained like the image **1724**. In order to correct the trajectory of the external object, the trajectory of the external object may be corrected using the operation described in FIG. **17**B.

[0244] Referring to FIG. **17**B, the processor **210** may obtain an image **1751** within a time interval **1741**. The processor **210** may set the image **1751** as a frame **1760-1** which is a first frame among the plurality of frames **1760**. The processor **210** may store the image **1751** in a buffer of the memory **230**.

[0245] The processor **210** may obtain an image **1752** within a time interval **1742**. The processor **210** may obtain the image **1772** by synthesizing the image **1751** stored in the buffer and the image **1752**. The processor **210** may set the image **1772** as a frame **1760-2** which is a second frame among the plurality of frames **1760**. The processor **210** may store the image **1772** in the buffer of the memory **230**.

[0246] The processor **210** may obtain an image **1753** within a time interval **1743**. For example, while the image **1753** is obtained, movement of the electronic device **200** may occur. For example, while the processor **210** obtains the image **1753**, the electronic device **200** may move and then return to the original position. A position of a visual object corresponding to an external object (e.g., a star) included in the image **1753** may be different from a position when the electronic device **200** does not move.

[0247] The processor **210** may obtain an image **1773** by synthesizing the image **1772** stored in the buffer and the image **1753**. The processor **210** may set the image **1773** as a frame **1760-3** which is a third frame among the plurality of frames **1760**. Unlike FIG. **17**A, the processor **210** may not store the image **1773** in the buffer of the memory **230**. The processor **210** may not store the image **1773** in the buffer of the memory **230**, based on identifying that the electronic device **200** moves and then returns to the original position, while the image **1753** is obtained.

[0248] The processor **210** may identify (or obtain) the plurality of frames **1760** consisting of a plurality of images including the image **1751**, the image **1772**, the image **1773**, and an image **1774**, by repeating the above-described operation. The processor **210** may obtain video data consisting of the plurality of frames **1760**, and store the obtained video data in the memory **230**.

[0249] According to an embodiment, the processor **210** may accumulate and synthesize a plurality of images, and set the synthesized image as one of a plurality of frames constituting video data. The processor **210** may represent a trajectory of an external object through video data by setting the synthesized image as one of a plurality of frames constituting video data.

[0250] For example, as movement of the electronic device **200** occurs while obtaining the image **1753**, a trajectory of the external object may be represented differently from an actual trajectory only in the frame **1760-3**. The processor **210** may obtain the image **1774** by excluding the image **1773** constituting the frame **1760-3** from the image synthesis process. The processor **210** may display the trajectory of the external object identically to the actual trajectory in remaining frames excluding the frame **1760-3**. Since the trajectory of the external object is represented differently from the actual trajectory only in the frame **1760-3**, which is one of the plurality of frames **1760**, it may be difficult for the user to recognize it.

[0251] According to an embodiment, the processor **210** may exclude the frame **1760-3** from among the plurality of frames **1760**. By excluding the frame **1760-3** from among the plurality of frames **1760**, the processor **210** may display the trajectory of the external object identically to the actual trajectory, in the plurality of frames **1760**.

[0252] According to an embodiment, an electronic device (e.g., the electronic device **200**) is provided. The electronic device includes a camera (e.g., the camera **220**) including an image sensor, memory comprising one or more storage media, storing one or more computer programs (e.g., the memory **230**), and one or more processors (e.g., the processor **210**) communicatively coupled to the camera and the memory, wherein the one or more computer programs include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify, based on capability information of the image sensor, maximum exposure time of the camera as a first time interval, obtain, based on exposure time set as the first time interval, a first image using the camera, identify a second image constituting a first frame stored in the memory, obtain, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtain video data consisting of a plurality of frames including the first frame and the second frame.

[0253] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to obtain the first image by processing data obtained using the camera during a second time interval distinct from the first time interval based on the exposure time set as the first time interval.

[0254] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to obtain, based on configuring one frame per a third time interval including the first time interval and the second time interval, the video data consisting of a plurality of frames, and wherein the video data may be set to be played at 30 frames per second.

[0255] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to, after the third image constitutes the second frame, obtain, based on the exposure time set as the first time interval, a fourth image using the camera, and, based on identifying that a brightness value related to the fourth image is greater than or equal to a designated brightness value, configure the fourth image as a third frame which is next frame after the second frame.

[0256] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device, based on identifying that the brightness value related to the fourth image is greater than or equal to the designated brightness value, refrain from synthesizing the fourth image with the third image.

[0257] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify that the first image includes a first visual object, corresponding to an external object, disposed on a first position within the first image, identify that the second image includes a second visual object, corresponding to the external object, disposed on a second position distinct from the first position within the second image, and obtain, based on synthesizing the first image and the second image, the third image including the first visual object and the second visual object.

[0258] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify that a size of the first visual object corresponds to a size of the second visual object, based on identifying that the size of the first visual object corresponds to the size of the second visual object, identify that a distance between the first position and the second position is less than or equal to a designated distance, and, based on identifying that the distance between the first position and the second position is less than or equal to the designated distance, obtain the third image including the first visual object and the second visual object.

[0259] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to, based on an alpha-blending algorithm, synthesize the first image and the second image, wherein a brightness value of the first visual object included in the third image may be set greater than a brightness value of the second visual object included in the third image.

[0260] According to an embodiment, the processor may be configured to identify the first visual object corresponding to the external object among a plurality of visual objects included in the first image. The processor may be configured to identify the second visual object corresponding to the external object among a plurality of visual objects included in the second image.

[0261] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to identify a shape and a brightness value of each of the plurality of objects included in the first image, and identify, based on the shape and the brightness value of each of the plurality of objects, the first visual object which satisfies a designated condition among the plurality of objects.

[0262] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to remove remaining visual objects excluding the first visual object among the plurality of visual objects included in the first image and remaining visual objects excluding the second visual object among the plurality of visual objects included in the second image, from the third image.

[0263] According to an embodiment, the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to, after the third image constitutes the second frame, obtain, based on the exposure time set as the first time interval, a fourth image using the camera, store, in the memory, a fifth image obtained based on synthesizing the third image and the fourth image, after the fifth image is stored, obtain, based on the exposure time set as the first time interval, a sixth image using the camera, based on synthesizing the fifth image and the sixth image, obtain a seventh image, and configure the seventh image as a third frame which is next frame after the second frame.

[0264] According to an embodiment, a method performed by an electronic device may include identifying, by the electronic device, based on capability information of an image sensor of a camera of the electronic device, maximum exposure time of the camera as a first time interval, obtaining, by the electronic device, based on exposure time set as the first time interval, a first image using the camera, identifying, by the electronic device, a second image constituting a first frame stored in memory of the electronic device, obtaining, by the electronic device, based on synthesizing the first image and the second image, a third image, and, based on configuring the third image as a second frame which is next frame after the first frame, obtaining, by the electronic device, video data consisting of a plurality of frames including the first frame and the second frame.

[0265] According to an embodiment, the method may include obtaining the first image by processing data obtained using the camera during a second time interval distinct from the first time interval based on the exposure time set as the first time interval.

[0266] According to an embodiment, the method may include obtaining, based on configuring one frame per a third time interval including the first time interval and the second time interval, the video data consisting of a plurality of frames, wherein video data may be set to be played at 30 frames per second.

[0267] According to an embodiment, the method may include, after the third image constitutes the second frame, obtaining, based on the exposure time set as the first time interval, a fourth image using the camera, and, based on identifying that a brightness value related to the fourth image is greater than or equal to a designated brightness value, configuring the fourth image as a third frame which is next frame after the second frame.

[0268] According to an embodiment, the method may include identifying that the first image includes a first visual object, corresponding to an external object, disposed on a first position within the first image, identifying that the second image includes a second visual object, corresponding to the external object, disposed on a second position distinct from the first position within the second image, and obtaining, based on synthesizing the first image and the second image, the third image including the first visual object and the second visual object.

[0269] According to an embodiment, the method may include identifying that a size of the first visual object corresponds to a size of the second visual object, based on identifying that the size of the first visual object corresponds to the size of the second visual object, identifying that a distance between the first position and the second position is less than or equal to a designated distance, and based on identifying that the distance between the first position and the second position is less than or equal to the designated distance, obtaining the third image including the first visual object and the second visual object.

[0270] According to an embodiment, the method may include, based on an alpha-blending algorithm, synthesizing the first image and the second image, wherein a brightness value of the first visual object included in the third image may be set greater than a brightness value of the second visual object included in the third image.

[0271] According to an embodiment, the method may include, after the third image constitutes the second frame, obtaining, based on the exposure time set as the first time interval, a fourth image using the camera, storing, in the memory, a fifth image obtained based on synthesizing the third image and the fourth image, after the fifth image is stored, obtaining, based on the exposure time set as the first time, a sixth image using the camera, based on synthesizing the fifth image and the sixth image, obtaining a seventh image, and configuring the seventh image as a third frame which is next frame after the second frame.

[0272] The electronic device according to various embodiments may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

[0273] It should be appreciated that various embodiments of the disclosure and the terms used therein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. As used herein, each of such phrases as “A or B,” “at least one of A and B,” “at least one of A or B,” “A, B, or C,” “at least one of A, B, and C,” and “at least one of A, B, or C,” may include any one of or all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as “1st” and “2nd,” or “first” and “second” may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term “operatively” or “communicatively”, as “coupled with,” or “connected with” another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

[0274] As used in connection with various embodiments of the disclosure, the term “module” may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, “logic,” “logic block,” “part,” or “circuitry”. A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

[0275] Various embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may

invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the term “non-transitory” simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between a case in which data is semi-permanently stored in the storage medium and a case in which the data is temporarily stored in the storage medium.
[0276] According to an embodiment, a method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.
[0277] According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities, and some of the multiple entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components may be omitted, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, according to various embodiments, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.
[0278] While the disclosure has been shown and described with reference to various embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the disclosure as defined by the appended claims and their equivalents.

Claims

1. An electronic device comprising: a camera including an image sensor; memory, comprising one or more storage media, storing one or more computer programs; and one or more processors comprising processing circuitry, wherein the one or more computer programs include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: identify, based on capability information of the image sensor, maximum exposure time of the camera as a first time interval, obtain, based on exposure time set as the first time interval, a first image using the camera, identify a second image constituting a first frame stored in the memory, obtain, based on synthesizing the first image and the second image, a third image, and based on configuring the third image as a second frame which is next frame after the first frame, obtain video data consisting of a plurality of frames including the first frame and the second frame.
2. The electronic device of claim 1, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually

or collectively, cause the electronic device to obtain the first image by processing data obtained using the camera during a second time interval distinct from the first time interval based on the exposure time set as the first time interval.
3. The electronic device of claim 2, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to obtain, based on configuring one frame per a third time interval including the first time interval and the second time interval, the video data consisting of a plurality of frames, and wherein the video data is set to be played at 30 frames per second.
4. The electronic device of claim 1, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: after the third image constitutes the second frame, obtain, based on the exposure time set as the first time interval, a fourth image using the camera, and based on identifying that a brightness value related to the fourth image is greater than or equal to a designated brightness value, configure the fourth image as a third frame which is next frame after the second frame.
5. The electronic device of claim 4, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to, based on identifying that the brightness value related to the fourth image is greater than or equal to the designated brightness value, refrain from synthesizing the fourth image with the third image.
6. The electronic device of claim 1, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: identify that the first image includes a first visual object, corresponding to an external object, disposed on a first position within the first image, identify that the second image includes a second visual object, corresponding to the external object, disposed on a second position distinct from the first position within the second image, and obtain, based on synthesizing the first image and the second image, the third image including the first visual object and the second visual object.
7. The electronic device of claim 6, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: identify that a size of the first visual object corresponds to a size of the second visual object, based on identifying that the size of the first visual object corresponds to the size of the second visual object, identify that a distance between the first position and the second position is less than or equal to a designated distance, and based on identifying that the distance between the first position and the second position is less than or equal to the designated distance, obtain the third image including the first visual object and the second visual object.
8. The electronic device of claim 6, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to, based on an alpha-blending algorithm, synthesize the first image and the second image, and wherein a brightness value of the first visual object included in the third image is set greater than a brightness value of the second visual object included in the third image.
9. The electronic device of claim 6, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: identify the first visual object corresponding to the external object among a plurality of visual objects included in the first image, and identify the second visual object corresponding to the external object among a plurality of visual objects included in the second image.
10. The electronic device of claim 9, wherein the one or more computer programs further include

computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: identify a shape and a brightness value of each of the plurality of visual objects included in the first image, and identify, based on the shape and the brightness value of each of the plurality of visual objects, the first visual object which satisfies a designated condition among the plurality of visual objects.

11. The electronic device of claim 9, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: remove remaining visual objects excluding the first visual object among the plurality of visual objects included in the first image and remaining visual objects excluding the second visual object among the plurality of visual objects included in the second image, from the third image.

12. The electronic device of claim 1, wherein the one or more computer programs further include computer-executable instructions that, when executed by the one or more processors individually or collectively, cause the electronic device to: after the third image constitutes the second frame, obtain, based on the exposure time set as the first time interval, a fourth image using the camera, store, in the memory, a fifth image obtained based on synthesizing the third image and the fourth image, after the fifth image is stored, obtain, based on the exposure time set as the first time interval, a sixth image using the camera, based on synthesizing the fifth image and the sixth image, obtain a seventh image, and configure the seventh image as a third frame which is next frame after the second frame.

13. A method performed by an electronic device, the method comprising: identifying, by the electronic device, based on capability information of an image sensor of a camera of the electronic device, maximum exposure time of the camera as a first time interval; obtaining, by the electronic device, based on exposure time set as the first time interval, a first image using the camera; identifying, by the electronic device, a second image constituting a first frame stored in memory of the electronic device; obtaining, by the electronic device, based on synthesizing the first image and the second image, a third image; and based on configuring the third image as a second frame which is next frame after the first frame, obtaining, by the electronic device, video data consisting of a plurality of frames including the first frame and the second frame.

14. The method of claim 13, further comprising obtaining the first image by processing data obtained using the camera during a second time interval distinct from the first time interval based on the exposure time set as the first time interval.

15. The method of claim 14, further comprising obtaining, based on configuring one frame per a third time interval including the first time interval and the second time interval, the video data consisting of a plurality of frames, wherein the video data is set to be played at 30 frames per second.

16. The method of claim 13, further comprising: after the third image constitutes the second frame, obtaining, based on the exposure time set as the first time interval, a fourth image using the camera; and based on identifying that a brightness value related to the fourth image is greater than or equal to a designated brightness value, configuring the fourth image as a third frame which is next frame after the second frame.

17. The method of claim 16, further comprising, based on identifying that the brightness value related to the fourth image is greater than or equal to the designated brightness value, refraining from synthesizing the fourth image with the third image.

18. The method of claim 13, further comprising: identifying that the first image includes a first visual object, corresponding to an external object, disposed on a first position within the first image; identifying that the second image includes a second visual object, corresponding to the external object, disposed on a second position distinct from the first position within the second image; and obtaining, based on synthesizing the first image and the second image, the third image including the first visual object and the second visual object.

19. One or more non-transitory computer-readable storage media storing one or more computer programs including computer-executable instructions that, when executed by one or more processors of an electronic device individually or collectively, cause the electronic device to perform operations, the operations comprising: identifying, by the electronic device, based on capability information of an image sensor of a camera of the electronic device, maximum exposure time of the camera as a first time interval; obtaining, by the electronic device, based on exposure time set as the first time interval, a first image using the camera; identifying, by the electronic device, a second image constituting a first frame stored in memory of the electronic device; obtaining, by the electronic device, based on synthesizing the first image and the second image, a third image; and based on configuring the third image as a second frame which is next frame after the first frame, obtaining, by the electronic device, video data consisting of a plurality of frames including the first frame and the second frame.

20. The one or more non-transitory computer-readable storage media of claim 19, the operations further comprising: obtaining the first image by processing data obtained using the camera during a second time interval distinct from the first time interval based on the exposure time set as the first time interval.