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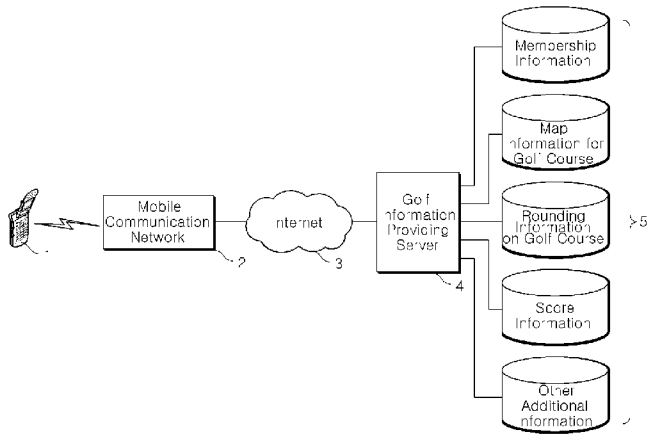
(54) **Title:** METHOD AND SYSTEM FOR PROVIDING GOLF-RELATED CONTENT USING MOBILE TERMINAL



(57) **Abstract:** The present invention relates to a system for providing golf-related contents using a mobile terminal, the system including: a server searching for a geographic image corresponding to selection information of a user from a storing unit storing various kinds of golf-related contents that includes the geographic image corresponding to each golf course and each hole to transmit it to the mobile terminal; and a mobile terminal receiving the selection information on the golf course and the hole from the user to transmit it to the server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, where the mobile terminal simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information, the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map. Thereby, the present invention can provide various golf -related contents irrespective of whether there is GPS equipment.

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Description

METHOD AND SYSTEM FOR PROVIDING GOLF-RELATED CONTENT USING MOBILE TERMINAL

Technical Field

[1] The present invention relates to a method and a system for providing golf-related contents, and more specifically to a method and a system for providing golf-related contents capable of more efficiently providing geographic image and distance information on a golf course using a mobile terminal.

Background Art

[2] Generally, in a golf game, the more information on a golf course a golfer obtains the better score he gets. This is because topography, distance to a hole cup, altitude, and gradient are different and also both a position and a distance of an obstacle zone, such as a sand trap, a bunker, a water hazard, etc., are different in design, every golf course and every hole of each golf course thereby having effect on the score of the golfer. In particular, if the golfer can accurately ascertain the distance from his own current position to the hole cup, the golfer's game ability is greatly enhanced.

[3] In the past, it is common that the golfer ascertained the distance based on his/her own experience or a caddie's experience and selected a golf club based on the ascertained distance and then played the game, this may be done using methods such as estimating a distance to a marker nearest a ball by eye by use of the marker indicating a distance along paths of each hole, or obtaining the information on the arrangement of the holes and the obstacle zones using distance measuring equipment such as a telescope or a golf course information book and ascertaining the distance to the hole cup, etc.

[4] However, although amateur golfers lacking experience use the methods as described above, it is very difficult for them to measure the distance from their current positions to the hole cup so that the accuracy of shot is degraded.

[5] Meanwhile, as the methods to solve the problems as described above, there are Korean Patent Registration No. 448,992 that discloses an apparatus for providing a portable golf-related contents for ascertaining a golfer's current position and measuring the distance to the hole cup using a global positioning system (Hereinafter, referred to as GPS) and Korean Publication Patent No. 2004-20201 that discloses a system measuring the distance within a golf course using a GPS and a wireless communication network.

[6] It is based on the premise that these methods should comprise a dedicated terminal mounted with a GPS receiving apparatus or a mobile terminal mounted with a GPS

receiver. However, most mobile terminals, which are currently wide spread, do not comprise the GPS receiving apparatus. Accordingly, it still has the problem that the general mobile terminals not having the GPS receiving apparatus cannot provide the golf-related contents.

[7] On the other hand, during an actual golf game, there are many cases that the portable golf information providing apparatus is away from an actual position of a ball. At this time, prior to moving to the point where the ball is located, it is more effective to ascertain the distance and select a proper club and then move to the position where the ball is located.

Disclosure of Invention

Technical Problem

[8] However, it has the problem that the portable golf information providing apparatus using the GPS receiving apparatus calculates the distance based on its own current position, not based on a current position of a ball so that a user cannot measure an accurate distance. Also, in order to map out a strategy for successfully completing a golf course irrespective of the current position of the ball, even in the case of measuring the distance from the ascertained position of the ball to the targeted point, the same problems occur.

Technical Solution

[9] Accordingly, the present invention proposes to solve the problems. It is an object of the present invention to provide a method and a system for providing golf-related contents providing reference information capable of easily ascertaining the distance along with realistic image of a golf course actually viewed by a user using a mobile terminal.

[10] Also, it is another object of the present invention to provide a method and a system for providing golf-related contents which more effectively provides geographic image and distance information on a golf course even in the case of a general mobile terminal not having a GPS receiving apparatus.

[11] Further, it is another object of the present invention to provide a method and a system for providing golf-related contents which more effectively provides distance information between optional two points selected by comparing the natural features of a circumference with provided geographic image of a selected golf course, without using a current position of a receiving equipment as a reference even in the case of a mobile terminal having a GPS receiving apparatus.

Advantageous Effects

[12] According to the present invention, a method and a system for providing golf-related contents providing reference information capable of easily ascertaining the

distance along with realistic image of a golf course actually viewed by a user using a mobile terminal is provided. Also, a method and a system for providing golf-related contents which more effectively provides geographic image and distance information on a golf course even in the case of using a general mobile terminal not having a GPS receiving apparatus is provided.

[13] In other words, a user can easily ascertain a distance between optional two points by displaying a three-dimensional ortho image close to realistic image made using altitude information included in a digital topographical map of a satellite photograph or an aerial photograph and distance information in a concentric circle with a constant interval to be able to easily ascertain a distance from a reference point. Also, a user can easily ascertain a distance between the optional two points by displaying geographic image at various altitude positions where the altitudes are corrected, together with altitude-corrected space data, according to a user's eye level. Further, a user can easily select the optional two points between which he/she wishes to know a distance by providing geographic image close to realistic image and comparing the geographic image displayed on screen with actual natural features and can obtain an actual distance between more accurate two points using the space data corresponding to the relative coordinates of the two points selected.

[14] Further, it can provide various geographic images while changing the altitude position, the reference point, a display interval of a concentric circle, and a display unit, etc.

[15] Therefore, the user can measure the distance between the optional two points he/she has selected irrespective of whether there is the GPS receiving apparatus. Also, the user variously selects the optional two points on the geographic image displayed on the screen while comparing the actual natural features irrespective of the current position of the mobile equipment measured by means of the GPS receiving apparatus so that various simulation distances such as a driving distance or a remaining distance, a distance to a targeted point, and a distance to hazards, etc., can be obtained.

[16] Also, various geographic images such as the entire hole image, partial hole image, side image, contour image, etc., viewed from various angles using the graphic image from graphically processing the satellite photograph or the aerial photograph can be displayed so that the user can obtain various information.

Brief Description of the Drawings

[17] These and other features, aspects, and advantages of preferred embodiments of the present invention will be more fully described in the following detailed description, taken in conjunction with the accompanying drawings. In the drawings:

[18] FIG. 1 is a schematic view showing a constitution of a system for providing golf-

related contents according to one embodiment of the present invention;

[19] FIG. 2 is block diagram showing one example of a mobile terminal constitution constituting the system for providing the golf-related contents;

[20] FIG. 3 is block diagram showing one example of a server constitution constituting the system for providing the golf-related contents;

[21] FIGS. 4 to 9 are views showing various embodiments for displaying the golf-related contents on a mobile terminal according to the present invention;

[22] FIG. 10 is a reference view for explaining a method of calculating a distance between optional two points according to one embodiment of the present invention;

[23] FIGS. 11 and 12 are examples of a user input device according to the present invention;

[24] FIG. 13 is a diagram for explaining an operation of the system for providing the golf-related contents according to the present invention;

[25] FIG. 14 is a flow chart showing a method for providing the golf-related contents from a server according to one embodiment of the present invention;

[26] FIG. 15 is a reference view showing a process of creating geographic image including space data provided from the server according to one embodiment of the present invention;

[27] FIGS. 16 to 19 are reference views showing in more detail a process of creating ortho image for each hole using coordinate information and altitude information extracted from a digital topographical map and satellite image; and,

[28] FIGS. 20 to 22 are reference views showing a process of displaying a geographic image screen on which distance information is displayed in a concentric circle form by combining the ortho image for each hole with the space data for the respective hole, according to one embodiment of the present invention.

Best Mode for Carrying Out the Invention

[29] According to one aspect of the present invention, there is provided a system for providing golf-related contents using a mobile terminal, including: a server searching for a geographic image corresponding to selection information of a user from a storing unit storing various kinds of golf-related contents that includes the geographic image corresponding to each golf course and each hole to transmit it to the mobile terminal; and a mobile terminal receiving the selection information on the golf course and the hole from the user to transmit it to the server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, where the mobile terminal simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course cor-

responding to the selection information, the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map.

[30] At this time, it is preferable that the mobile terminal calculates the distance between optional two points selected, using the space data included in the geographic image received from the server to display it on the screen, if the user compares the actual natural features with the geographic image displayed on the screen and inputs the selection information of the optional two points whose distance therebetween the user would like to obtain.

[31] Also, it is preferable that the distance information displayed in the concentric circle form is displayed by correcting the interval between the respective concentric circles according to perspective from the aerially depicted altitude and position.

[32] According to another aspect of the present invention, there is provided a mobile terminal having a function for providing golf-related contents, including: a transceiver module; a user input controller receiving selection information on golf course and a hole from a user and receiving selection information on optional two points whose distance therebetween would like to be obtained; a display controller receiving the selection information on the golf course and the hole from the user through the transceiver module to transmit it to server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, where the display controller simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information; and an application program controller calculating the distance between the selected optional two points using the space data included in the geographic image received from the server through the transceiver module to transfer it to the display controller, the display controller receiving the distance information calculated from the application program controller to display it on the screen.

[33] According to another aspect of the present invention, there is provided a method for providing golf-related contents using a mobile terminal including the steps of: (a) receiving selection information on the golf course to transmit it to a server; and (b) receiving geographic image corresponding to the selection information of the user from a storing unit storing various kinds of golf-related contents including the geographic image corresponding to each golf course and each hole and displaying it on screen and simultaneously displaying distance information in a concentric circle form

with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information, the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map.

[34] According to another aspect of the present invention, there is provided a method for providing golf-related contents using a mobile terminal including the steps of: (a) receiving selection information on the golf course from the mobile terminal; (b) searching for geographic image of a golf course corresponding to the selection information from the storing unit storing various kinds of golf-related contents including the geographic image corresponding to each golf course and each hole and the associated space data; and (c) transmitting the searched geographic image of the golf course and the associated space data to the mobile terminal; the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map.

[35] According to another aspect of the present invention, there is provided a system for providing golf-related contents using a mobile terminal, including: a server searching for a geographic image corresponding to selection information from a storing unit storing various kinds of golf-related contents that includes the geographic image corresponding to each golf course and each hole to transmit it to the mobile terminal and receiving the selection information on the optional two points whose distance therebetween would like to be obtained from the mobile terminal to calculate the distance between the optional two points by using the space data associated with the corresponding geographic image to transmit it to the mobile terminal; and a mobile terminal receiving the selection information on the golf course to transmit it to the server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, where the mobile terminal simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information, the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an

aerial photograph image having coordinate information using altitude information included in a digital topographical map.

Mode for the Invention

[36] Hereinafter, the preferred embodiments of the present invention will be described with reference to the accompanying drawings. The detailed description of known functions and configurations will be omitted so as not to obscure the subject of the present invention with unnecessary detail. The terms used in the specification are defined by considering the functions in the present invention. These terms can be varied according to a practice or intention of a user or operator. Therefore, the definition thereof should be defined based on the whole contents of the specification.

[37] FIG. 1 is a constitutional view of a system for providing golf-related contents according to one embodiment of the present invention

[38] Referring to FIG. 1, the system for providing the golf-related contents according to the present invention is constituted by a mobile terminal 1 and a server 4 for providing the golf-related contents. The server 4 for providing the golf-related contents comprises a storing unit 5 storing membership information, geographic image information including space data for a golf course, rounding information on a golf course, score information, or the golf-related contents including other additional information. The mobile terminal and the server for providing the golf-related contents are connected to each other through a mobile communication network 2 or an internet network 3.

[39] The mobile terminal 1 receives selection information on a golf course or a hole from a user to transmit it to the server 4 and receives the geographic image of the golf course corresponding to the selection information from the server and displays it on its screen. At this time, it displays the distance information in a concentric circle form with a predetermined distance interval from a reference point based on the space data included in the geographic image of the golf course corresponding to the selection information, that is, distance-related numeral value information displayed in a predetermined interval from the reference point. If a user uses the distance information displayed together with the geographic image in the concentric circle form with 10m interval, 20m interval, or 50m interval from the reference points such as a T-shot point, a central point of a left green or a central point of a right green, for example, he/she can easily ascertain the distance from a current position of a ball to a targeted position using only the geographic image. At this time, the geographic image displays various features used as a reference so as to be close to the realistic image, making it possible to easily ascertain the distance between the optional two points that is desired to be measured using the distance information in the concentric circle form. Also, the error

of the distance measurement can be reduced by adjusting the interval in the concentric circle form displayed.

[40] Herein, the geographic image according to the present invention is characterized in that it includes at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having the coordinate information using the altitude information included in a digital topographical map. Accordingly, the present invention can display the ortho image viewed from above at an angle of 90° as well as the geographic image viewed from various altitude positions such as 15°, 20°, 25°, or 30°, etc., which are close to the user's eye level and displays the properly altitude-corrected space data to be matched to the geographic image with various angles displayed. As the altitude position is changed, the image is changed and displayed as the image shape viewed from the user's eye level and the respective intervals of the distance information in the concentric circle form using the space data are corrected and displayed to be different from each other according to perspective. In other words, if the concentric circle displaying the distance, for example, in 20m interval is displayed, as the concentric circle is near the position viewed by the user, its interval is widely displayed on the screen and as the concentric circle is far away from the position viewed by the user, its interval is narrowly displayed on the screen. Therefore, the present invention can display the geographic image close to the realistic image that is more true to nature and at the same time, can accurately measure the distance by correcting the error due to the optical illusion phenomenon according to the altitude position. The process of creating the geographic image, including the space data, according to the present invention using the satellite photograph image or the aerial photograph image will be described in more detail following FIG. 16.

[41] Also, in order to more accurately measure the distance, the mobile terminal 1 can receive the selection information on the optional two points whose distance therebetween would like to be obtained from a user and transmit it to the server 4, receive the geographic image corresponding to the selected information from the server and the space data associated therewith, and calculate the accurate distance between the two points selected using the received space data to display the distance on the screen. The ortho image of 90° as well as the images at various altitude positions of 15°, 20°, 30°, etc., also include the space data corrected according to the altitude positions, making it possible to more accurately perform the distance calculation using the altitude-corrected space data.

[42] Meanwhile, the server 4 for providing the golf-related contents searches for the geographic image corresponding to the selection information and the space data

associated with the geographic image from the storing unit 5 storing various golf-related contents including the geographic image corresponding to each golf course and each hole and transmits them to the mobile terminal 1. More specifically, FIG. 2 shows one example of the mobile terminal constitution constituting the system for providing the golf-related contents and FIG. 3 is one example of the server constitution constituting the system for providing the golf-related contents.

[43] Referring first to FIG. 2, the mobile terminal 1 comprises a transceiver module 10, an application program controller 12, a display controller 14, and a user input processor 16. The user input processor 16 receives the selection information on the golf course, for which the golf-related contents are required, from a user through the selection menu for the golf course and the selection information on the optional two points whose distance therebetween would like to be obtained. In particular, the user can select the optional two points whose distance therebetween would like to be obtained, using a directional key or a pointing device included in the mobile terminal 1. At this time, the user looks around the geographic image displayed on the mobile terminal and the distance information displayed in the concentric circle or the natural features of the actual golf course, for example, a tree in the rough, a bunker, a water hazard, a position of a tree, and the like and can select the optional two points whose distance therebetween would like to be obtained based on them. Also, the user can measure the distance from a current position of ball to a targeted point and simulate a strategy for successfully completing a golf course by selecting the optional two points whose distance therebetween would like to be obtained, irrespective of the current position of the ball. For example, the user can previously select a strategy point with respect to a T shot, a second shot, an approach shot, etc., and measure the distance.

[44] The application program controller 12 calculates the distance between the optional two points selected by the user using the space data associated with the geographic image received through the transceiver module 10. The application program controller 12 downloads a plug in application program for a distance calculation from the contents server (not shown), installs it and then performs the distance calculation by controlling the installed plug in application program. Also, it can control reproduction of a text, a still picture, a moving picture, an animation, and a variety of additional information in a voice file form, which are received from the server 4. The display controller 14 displays the geographic image received from the server and the distance information between the optional two points calculated by means of the application program controller 12.

[45] Referring to FIG. 3, the server 4 for providing the golf-related contents comprises a controller 20, a transceiver module 21, the storing unit 5, and a provider 23 providing a course image and an associated space data. The server 4 for providing the golf-related

contents can further comprise an additional information provider 24 providing various additional information, such as gradient information, course rounding information, game data, club selection information according to a targeted distance, green information, hit direction information, etc.

[46] The storing unit 5 stores various golf-related contents including the geographic image corresponding to each golf course and each hole. For example, it can store a variety of golf-related information, such as membership information, geographic image information including space data, course rounding information, score information, green information, rounding information for every shot, golf course reservation information, golf course rough map guiding information, etc. The storing unit 5 can store the information in one database, divide the information and store it into a plurality of databases, or store the information in databases distributed in a plurality of servers, according to the selection of the designer.

[47] The controller 20 receives the selection information on the golf course and the hole from the mobile terminal and transmits the various golf-related contents corresponding to the selection to the mobile terminal, through the transceiver module 21.

[48] A provider 26 providing the course image and the associated space data searches the geographic image corresponding to the selection information on the golf course received and the associated various space data from the storing unit 5 and transmits them to the controller 20. Herein, the geographic image is characterized in that it includes at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having the coordinate information using the altitude information included in a digital topographical map. The graphic image can include various geographic images such as the entire hole image, partial hole image, the entire hole image viewed from various angles, partial hole image viewed from various angles, contour image representing an altitude of a hole, or side image representing the gradient of a hole, etc.

[49] Meanwhile, the geographic image provided can be divided and transmitted into the information on the entire golf course, partial course, or one course, according to the request of the mobile terminal. It is associated with an accounting server (not shown) to charge the mobile terminal according to the amount of the respective transmitted information.

[50] The space data is referred to as the distance information converted according to the altitude using the coordinate information of the geographic image and the altitude information of the digital topographical map. In addition to this, the altitude information, numerical value information by which the contour line is formed as data, gradient information of a reference point, longitude and latitude information of a reference point,

etc. as the space data can further be stored.

[51] In addition to the geographic image and the associated space data, a variety of additional information can be provided. The gradient information of each hole can be provided and the course rounding information required for successfully completing the hole according to the feature of the hole, such as whether the hole is sloped left, whether the hole is sloped right, whether the hole is flat, whether there is an obstacle zone, such as a sand trap, a bunker, or a water hazard, etc., can be provided. The course rounding information can be provided in a text file or a voice file by means of the voice recording of the course rounding information of an experienced caddie or an expert and can be provided in a multimedia file, including an animation file such as a flash simulating the strategy for the course rounding, a still picture file, or a moving file. Also, a variety of additional information such as the club selection information corresponding to the targeted distance, the hit direction information, the green information, the shape, position, and distance information of the natural features, etc. can be provided. Also, the accumulated information on the golfer's score up to the corresponding hole or the golfer's game data in the past can be provided. In addition to this, a variety of additional information, such as the golf course reservation information, the golf course rough map guiding information, travel guide around the golf course, etc. can further be provided.

[52] FIGS. 4 to 9 are views showing various embodiments for displaying the golf-related contents on a mobile terminal according to the present invention.

[53] Referring to FIG. 4, there is shown an example of displaying the geographic image of the hole on a display window of a mobile terminal using the satellite photograph or the aerial photograph as it is. The user can request the distance information by selecting the optional two points on the geographic image shown and the actual distance between the two points calculated by means of the server is displayed on the display window together with the geographic image. At this time, the user can receive various distance information according to what point the user selects, such as a distance from a position of a T shot to a green, a distance from a position of a T shot to a hole cup, a distance from a position of a T shot to a bunker or a hazard, a driving distance of a shot, a remaining distance from a current position of a ball to a hole cup, a distance from a current position of a ball to a targeted point, etc. Also, the user can select various optional points whose distance therebetween would like to be measured, such as a current position of a ball, a position of a targeted point, a virtual position of a ball, etc., by comparing the geographic image and actual natural features such as a tree in the rough, a tree, a hazard, a bunker, etc.

[54] Thereby, the user can receive the distance information by variously changing the targeted point from the current position of the ball to the targeted point on the

displayed geographic image so that he/she can simulate the strategy for successfully completing the hole. The user receives the information on the distance from the current position of the ball to the front of the hazard and the distance from the current position of the ball to the green beyond the hazard in order to determine whether he/she should drive a ball to the front of the hazard with the second shot and can then safely reach the green with the third shot or whether he/she can directly reach the green by resolutely driving a ball beyond the hazard with the second shot, so that the information can be utilized to allow the user to simulate the strategy for reaching the green.

[55] Referring to FIG. 5, there is shown an example of displaying the three-dimensional graphic image graphically processing the satellite photograph or the aerial photograph on the display window of the mobile terminal. At this time, the position and distance information of the marker can also be displayed as well as the position and size of the obstacle zone such as a bunker or a hazard can be displayed. The user can obtain the distance information between the desired two points by selecting the optional two points on the geographic image displayed.

[56] Referring to FIG. 6, there is shown an example of displaying the contour image together with the altitude on the display window of the mobile terminal. Referring to FIG. 7, there is shown an example of the side image displaying the gradient of the hole. The contour image or the side image can be obtained by means of the two-dimensional or three-dimensional graphic process of the original drawing of the aerial photograph or the satellite photograph using a commercial graphic tool and the storing unit of the server 4 can store the aerial photograph or the satellite photograph as well as the graphic processed image in two-dimensions or the three-dimensions.

[57] Further, referring to FIGS. 8 and 9, there are shown examples displaying the entire hole image or the partial hole image viewed from various angles with respect to the graphically processed image. In addition to this, the entire hole image or the partial hole image can be displayed in an enlarged or reduced state.

[58] Meanwhile, FIG. 10 is a reference view for explaining a method of calculating a distance between optional two points according to one embodiment of the present invention.

[59] Referring to FIG. 10, there is shown the method of calculating the distance between the optional two points whose distance therebetween would like to be measured. In order to calculate the distance, the space data of the corresponding two points included in the geographic image is read using relative coordinates of the optional two points selected by the user so that the distance between the two points can be obtained on the geographic image displayed on the mobile screen.

[60] Meanwhile, according to another embodiment of the present invention, the server 4 receives the selection information on the optional two points from the mobile terminal

and uses the space data included in the corresponding geographic image to calculate the actual distance between the optional two points in the manner as described above, instead of calculating the distance information in the mobile terminal 1. In other words, the system for providing the golf-related contents can variously be designed since whether the distance calculation is made in the server side or in the mobile side is determined depending on the specification of the system or the intention of the designer.

[61] Also, the data server 4 storing the space data associated with the geographic image for the hole course in the golf course and providing the geographic image and the space data corresponding to the selection of the user, the mobile contents server (not shown) storing the plug in application program calculating the distance between the optional two points and downloading it to the mobile terminal, an authentication server (not shown) managing and authenticating the member subscribed in the golf-related contents providing service, and an accounting server (not shown) charging fees according to the amount of data used by the mobile terminal can be separately constituted or can be integrally constituted in one server according to the specification of the system or the intention of the designer.

[62] FIGS. 11 and 12 are examples of a user input device according to the present invention and show an input device selecting the optional two points whose distance therebetween would like to be obtained. As in FIG. 11, the optional point on the screen of the mobile terminal can be selected using four directional keys. At this time, in the case of pressing the directional key once short and once long, the number of moving pixels is designated differently. The user input device can be designed so that if the directional key is pressed once short, a cursor moves by one pixel and if the directional key is pressed once long, the cursor moves by one hundred pixels, for example. FIG. 12 shows an example of selecting the optional two points on the geographic image displayed on the display window using a pointing device.

[63] The method for providing the golf-related contents according to the present invention will be described below with reference to the constitution of the system for providing the golf-related contents. FIG. 13 is a diagram for explaining an operation of the system for providing the golf-related contents according to the present invention.

[64] Referring to FIG. 13, the mobile terminal 1 receives (S102) the selected information on the golf course and the hole, for which the golf-related contents would like to be received, from the user and transmits (S104) it to the server 4. The server 4 searches (S106) for the geographic image corresponding to the selection information received from the storing unit and the associated space data and transmits (S108) the searched geographic image and the space data to the mobile terminal. The mobile terminal displays (S110) the received geographic image on the screen. At this time, the

distance information is also displayed in the concentric circle form having a predetermined distance interval from the reference point based on the space data included in the geographic image of the golf course corresponding to the selection information. For example, if a user uses the distance information displayed together with the geographic image in the concentric circle form with 10m interval, 20m interval, or 50m interval from the reference points such as a T-shot point, a central point of a left green or a central point of a right green, he/she can easily ascertain the distance from a current position of a ball to a targeted position using only the geographic image displayed on the screen of the mobile terminal. The user operates a reference point selecting key included in the mobile terminal 1 to change the reference points such as the T-shot point, the central point of the left green or the central point of the right green, etc., making it possible to display the geographic image, and operates an interval selecting key included in the mobile terminal 1, making it possible to differently displaying the intervals of the concentric circle displayed such as 10m interval, 20m interval, 30m interval, or 50m interval. At this time, the geographic image displays various features used as a reference so as to be close to the realistic image, making it possible to easily ascertain the distance between the optional two points that is desired to be measured using the distance information in the concentric circle form. Also, the error of the distance measurement can be reduced by adjusting the interval in the concentric circle form displayed.

[65] Meanwhile, the geographic image according to the present invention is characterized in that it includes at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting the satellite photograph image or the aerial photograph image having the coordinate information using the altitude information included in a digital topographical map. Accordingly, the present invention can display the ortho image viewed from above at an angle of 90° as well as the geographic image viewed from various altitude positions such as 15°, 20°, 25°, or 30°, etc., which are close to the user's eye level and displays the properly altitude-corrected space data to be matched to the geographic image with various angles displayed. As the altitude position is changed, the image is changed and displayed as the image shape viewed from the user's eye level and the respective intervals of the distance information in the concentric circle form using the space data are corrected and displayed to be different from each other according to perspective. In other words, if the concentric circle displaying the distance, for example, in 20m interval is displayed, as the concentric circle is near the position viewed by the user, its interval is widely displayed on the screen and as the concentric circle is far away from the position viewed by the user, its interval is narrowly displayed on the screen. Therefore, the

present invention can display the geographic image close to the realistic image that is more true to nature and at the same time, can accurately measure the distance by correcting the error due to the optical illusion phenomenon according to the altitude position.

[66] Meanwhile, when measuring the more accurate distance between the optional two points, the selection information, on the two optional two points whose distance therebetween would like to be obtained, from the user is received (S112). The actual distance between the two points can be calculated (S116) using the space data corresponding to the relative coordinates of the input two points. The distance information calculated using the space data is displayed (S12) on the display window.

[67] Meanwhile, if the mobile terminal receives (S122) the request for the additional information from the user, it asks (S124) the server for the corresponding additional information. The server searches (S126) the additional information from the storing unit and transmits it to the mobile terminal and the mobile terminal displays or reproduces (S128) the searched additional information on the display window.

[68] FIG. 14 shows the operations of the system for providing the golf-related contents as described above in a point of view of the server and is a flow chart showing the method providing the golf-related contents from the server according to one embodiment of the present invention.

[69] Referring to FIG. 14, the mobile terminal 1 according to the present invention receives the select information on the golf course and the hole from the user and transmits (S200) it to the server and receives and displays (S202) the geographic image corresponding to the selection information from the server. At this time, the distance information can also be displayed in the concentric circle form having a predetermined interval using the space data associated with the corresponding geographic image. Also, it can receive (S204) the selection information on the optional two points whose distance therebetween would like to be obtained on the geographic image displayed from the user, calculate (S206) the actual distance between the optional two points selected using the space data associated with the geographic image, and display (S208) the calculated distance information on the screen. If the mobile terminal receives (S210) the request for the additional information from the user, it receives the additional information from the server 4 and reproduces (S212) it in a form suitable for the received file.

[70] FIG. 15 is a reference view showing a process of creating the geographic image including the space data provided from the server according to one embodiment of the present invention.

[71] Referring to FIG. 15, there is shown the process of creating the geographic image including the space data using the original drawing of the aerial photograph or the

satellite image including the coordinate information indicated by latitude and longitude and the digital topographical map including the altitude information according to the coordinates.

[72] The spatial positions of the two images are matched using the coordinate information included in the original drawing of the aerial photograph or the satellite image and the coordinate information included in the digital topographical map by using the commercial graphic tool and the ortho image of 90° having the altitude information according to the coordinate information from the matched two images is obtained.

[73] The reference points such as the hole image, the central point of the green, and the T shot point are extracted from the ortho image of 90° and the space data including the distance information in the concentric circle form with a predetermined interval from the reference points is generated. The geographic image formed by correcting the altitude of the ortho image of 90° at various angles is generated and is stored in the storing unit. At this time, the altitude-corrected geographic image includes the altitude-corrected space data.

[74] FIGS. 16 to 19 are reference views showing in more detail a process of creating the ortho image for each hole using the coordinate information and the altitude information extracted from the digital topographical map and the satellite image.

[75] A left screen of FIG. 16 displays an example of extracting a layer including a hole boundary of a golf course, which is a terrain element, from the digital topographical map, and a right screen of FIG. 16 shows an example of extracting a layer including a contour line indicating the altitude information from the digital topographical map. The terrain element included in the layer shown in the left is utilized as a ground center point (GCP) when geometrically correcting the satellite image. The altitude information included in the layer shown in the right is utilized for creating a digital elevation model (DEM) including the shape information of the terrain in creating a three-dimensional graphic.

[76] FIG. 17 shows one example of spatially matching the digital topographical map and the satellite image by designating the terrain element extracted from the digital topographical map, for example, the hole boundary of the golf course with the coordinate system such as the satellite image since the coordinate system of the terrain element is not defined.

[77] FIG. 18 shows an example of geometrically correcting the terrain element extracted from the digital topographical map using the GCP tool as described above, that is, the hole boundary of the golf course. The geometrically corrected hole boundary is coupled to the satellite image, which is subject to the orthometric correction of 90°, by using the altitude information to generate the three-dimensional ortho image of the golf

course. The generated geographic image of the golf course is displayed on the left screen of FIG. 19. Also, the reference points, such as the hole image, the central point of green , T shot point, are extracted from the ortho image of 90°, and the space data including the distance information in a concentric circle form with a constant interval is generated from the respective reference points. Further, in order to provide the realistic image viewed from the user at the various altitude positions, the geographic image formed by correcting the altitude of the ortho image of 90° at various angles is generated and is stored in the storing unit. At this time, the altitude-corrected geographic image includes the altitude-corrected space data.

[78] FIGS. 20 to 22 are reference views showing a process of displaying a geographic image screen on which distance information is displayed in a concentric circle form by combining the ortho image for each hole with the space data for the respective hole, according to one embodiment of the present invention.

[79] Referring to FIG. 20, there is shown an embodiment combining the space data for every hole with the ortho image obtained by using the altitude information (DEM) combined with the satellite image. Reviewing the concentric circle according to the space data shown, it can be appreciated that the concentric circle is indicated in the same interval. Also, it can be appreciated that the plurality of space data is stored according to the reference point, the interval displayed, and the unit displayed. Accordingly, if the user changes the selection information such as the reference point, the display interval, the display unit, etc., it is possible to display the geographic image displaying the distance information in various forms.

[80] Referring to FIG. 21, there is shown an embodiment combining the ortho image 90° with the altitude-corrected 30° geographic image and the altitude-corrected space data according to the altitude position (for example, 15°, 20°, 30°, etc.) selected by the user. Reviewing the concentric circle according to the space data shown, it can be appreciated that the concentric circle does not have the same interval but has the corrected interval according to the perspective from the position viewed from the user. Thereby, the realistic image approximately similar to one viewed from the hole in the actual golf course by the user can be displayed on the screen. The distance with the actually same 10m interval can of course be seen differently according to the perspective from the user. In other words, this is because it is natural that the 10m interval of the distance near the user is widely displayed, while the 10m interval of the distance far away from the user is narrowly displayed. Therefore, the user can ascertain the distance to the targeted point by eye by using the distance data in the corrected concentric circle form shown. As described above, when wishing to calculate the accurate distance between the two points, the user selects the corresponding menu to able to calculate the accurate distance.

[81] Meanwhile, the space data displayed on the right screen is varied according to the reference point selected by the user, that is, the central point of the left green or the central point of the right green. Also, the plurality of space data can be included according to whether the space data is displayed at some interval (for example, 10m, 20m, 30m, 50m, etc) from the reference point. The user operates the keys included in the mobile terminal 1 to change the reference point or control the distance interval displayed, making it possible to display it on the screen. Further, the user can display by selecting a representing unit as meter or yard.

[82] FIG. 22 shows an example of variously displaying the reference point, the distance interval displayed, and the representing unit on the screen by changing them.

[83] Meanwhile, the method for providing the golf-related contents using the mobile terminal according to the present invention can be implemented by the computer program. The codes and code segments constituting the program can easily be inferred by the computer programmer to which this field pertains. Also, the program is stored in a computer readable media and is read and performed by the computer to implement the method for providing the golf-related contents using the mobile terminal. The computer readable media includes a magnetic recording media, an optical recording media, and a carrier wave media.

[84] Although a few embodiments of the present invention have been shown and descri bed, it would be appreciated by those skilled in the art that changes could be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Industrial Applicability

[85] The invention relates to a method and a system for providing golf-related contents, and can effectively be applied to the industrial sector regarding a method and a system for providing golf-related contents to more effectively provide geographic image and distance information on a golf course using a mobile terminal.

Claims

[1] A system for providing golf-related contents using a mobile terminal, comprising:
a server searching for a geographic image corresponding to selection information of a user from a storing unit storing various kinds of golf-related contents that includes the geographic image corresponding to each golf course and each hole to transmit it to the mobile terminal; and
a mobile terminal connected to the server through a mobile communication network and receiving the selection information on the golf course and the hole from the user through the mobile communication network to transmit it to the server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, wherein the mobile terminal simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information,
the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map,
the distance information displayed in the concentric circle form being displayed by correcting the interval between the respective concentric circles according to perspective from the aerial altitude and position.

[2] The system of claim 1, wherein the mobile terminal calculates the distance between optional two points selected, using the space data included in the geographic image received from the server to display it on the screen, if the user compares the actual natural features with the geographic image displayed on the screen and inputs the selection information of the optional two points whose distance therebetween the user would like to obtain.

[3] The system of claim 1 or 2, wherein the geographic image includes at least one of the entire hole image, partial hole image, the entire hole image viewed from a plurality of altitudes, partial hole image viewed from a plurality of altitudes, contour image representing an altitude of a hole, or side image representing gradient of a hole, etc, and the provided geographic image includes each space data having the distance information corrected according to the altitude aerially depicted.

[4] The system of claim 1 or 2, wherein the reference point includes at least one of a T shot point, a central point of a left green, a central point of a right green, further including the space data corrected according to the position of the reference point.

[5] The system of claim 4, wherein the mobile terminal changes the position of the reference point according to the key input of the user and displays the space data corrected corresponding to the changed reference point on the screen.

[6] The system of claim 1 or 2, wherein the storing unit further includes additional information such as club selection information according to the targeted distance, hole rounding information, hit direction information, gradient information, altitude information, green information, the shape, position, and distance information of the natural features, or score information,
the mobile terminal receives the additional information based on the distance between the selected two points from the server to reproduce it in a text, a still picture, a moving picture, an animation, or a voice file form.

[7] A mobile terminal having a function for providing golf-related contents, comprising:
a transceiver module;
a user input controller receiving selection information on golf course and a hole from a user and receiving selection information on optional two points whose distance therebetween would like to be obtained;
a display controller receiving the selection information on the golf course and the hole from the user through the transceiver module to transmit it to server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, wherein the display controller simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information; and
an application program controller calculating the distance between the selected optional two points using the space data included in the geographic image received from the server through the transceiver module to transfer it to the display controller,
the display controller receiving the distance information calculated from the application program controller to display it on the screen.
the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite

photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map,
the distance information displayed in the concentric circle form being displayed by correcting the interval between the respective concentric circles according to perspective from the aerial altitude and position.

[8] The mobile terminal of claim 7, wherein the application program controller downloads a plug in application program for a distance calculation from the server, installs it and then performs the distance calculation by controlling the installed plug in application program.

[9] The mobile terminal of claim 7, wherein the application program controller receives the additional information based on the calculated distance information from the server to reproduce it in a text, a still picture, a moving picture, an animation, or a voice file form, and the additional information includes club selection information according to the targeted distance, hole rounding information, hit direction information, gradient information, altitude information, green information, the shape, position, and distance information of the natural features, or score information.

[10] The mobile terminal of claim 7, wherein the user input controller receives the selection information on the optional two points selected by comparing the actual natural features with the geographic image displayed on the screen using a directional key or a pointing device included in the mobile terminal.

[11] A method for providing golf-related contents using a mobile terminal comprising the steps of:
(a) receiving selection information on the golf course to transmit it to a server; and
(b) receiving geographic image corresponding to the selection information of the user from a storing unit storing various kinds of golf-related contents including the geographic image corresponding to each golf course and each hole and displaying it on screen and simultaneously displaying distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information,
the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map,
the distance information displayed in the concentric circle form being displayed

by correcting the interval between the respective concentric circles according to perspective from the aerial altitude and position.

[12] The method of claim 11, further comprising the steps of:

(c) receiving the selection information on the optional two points, whose distance therebetween would like to be obtained, from the user; and

(d) calculating the distance between the selected optional two points using the space data included in the geographic image received from the server and displaying it on the screen.

[13] The method of claim 12, further comprising the steps of:

(f) requesting the additional information from the server if the request for the additional information is input from the user; and

(g) receiving the additional information based on the calculated distance information as the additional information corresponding to the request from the server and reproducing it.

[14] A method for providing golf-related contents using a mobile terminal comprising the steps of:

(a) receiving selection information on the golf course from the mobile terminal;

(b) searching for geographic image of a golf course corresponding to the selection information from the storing unit storing various kinds of golf-related contents including the geographic image corresponding to each golf course and each hole and the associated space data; and

(c) transmitting the searched geographic image of the golf course and the associated space data to the mobile terminal;

the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map,

the distance information displayed in the concentric circle form being displayed by correcting the interval between the respective concentric circles according to perspective from the aerial altitude and position.

[15] The method of claim 14, further comprising the steps of:

(d) receiving a request for additional information on the searched golf course from the mobile terminal; and

(e) searching for the requested additional information from the storing unit to transmit it to the mobile terminal.

[16] A system for providing golf-related contents using a mobile terminal, comprising:

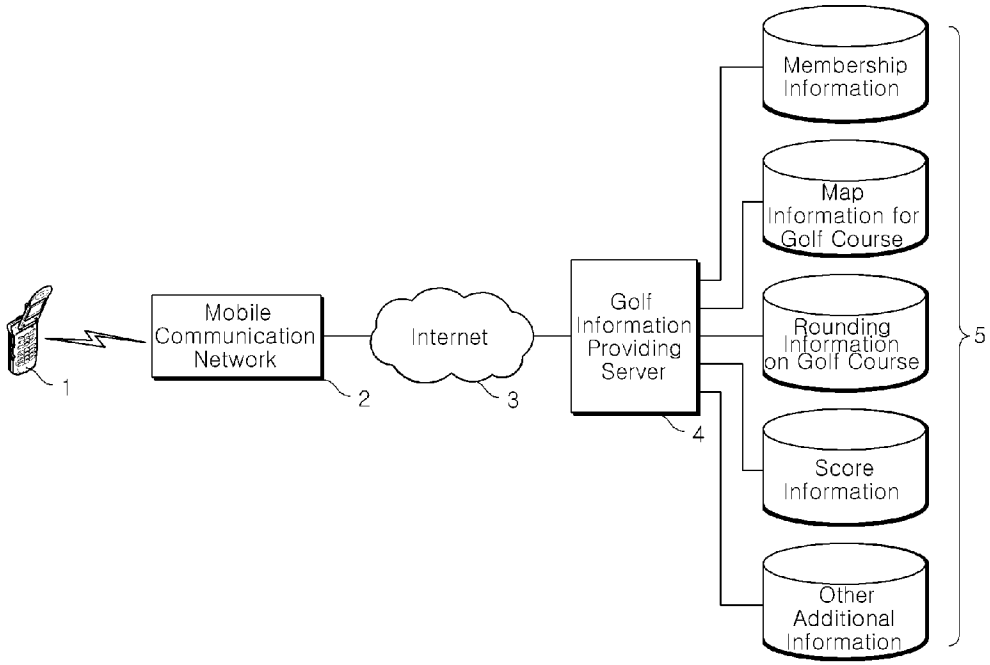
a server searching for a geographic image corresponding to selection information from a storing unit storing various kinds of golf-related contents that includes the geographic image corresponding to each golf course and each hole to transmit it to the mobile terminal and receiving the selection information on the optional two points whose distance therebetween would like to be obtained from the mobile terminal to calculate the distance between the optional two points by using the space data associated with the corresponding geographic image to transmit it to the mobile terminal; and

a mobile terminal connected to the server through a mobile communication network and receiving the selection information on the golf course through the mobile communication network to transmit it to the server and receiving the geographic image of the golf course corresponding to the selection information from the server to display it on a screen, wherein the mobile terminal simultaneously displays distance information in a concentric circle form with a predetermined distance interval from a reference point based on a space data included in the geographic image of the golf course corresponding to the selection information,

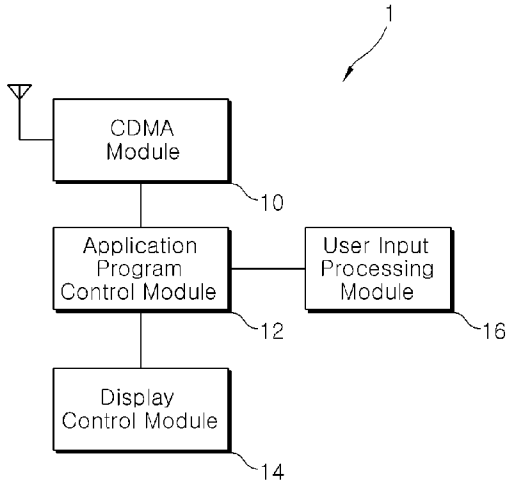
the geographic image including at least one space data having the distance information corrected according to the altitude aerially depicted as a three-dimensional graphic image graphically processed after correcting a satellite photograph image or an aerial photograph image having coordinate information using altitude information included in a digital topographical map,

the distance information displayed in the concentric circle form being displayed by correcting the interval between the respective concentric circles according to perspective from the aerial altitude and position.

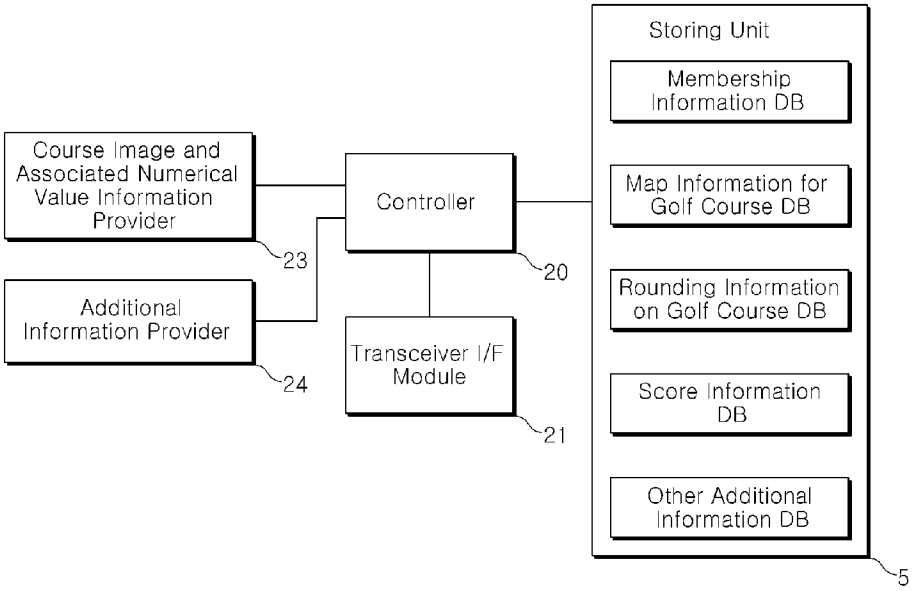
[Fig. 1]


Membership Information
Map Information for Golf Course
Rounding Information on Golf Course
Score Information
Other Additional Information
5
Mobile Communication Network
Internet
Golf Information Providing Server
1
2
3
4

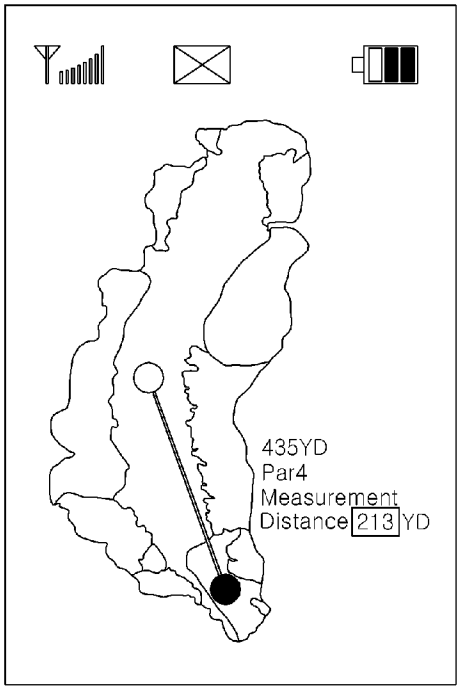
[Fig. 2]


1
CDMA Module
10
Application Program Control Module
User Input Processing Module
12
16
Display Control Module
14

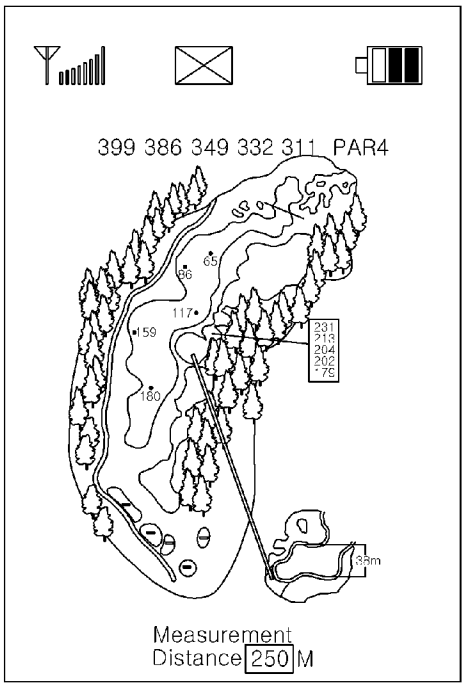
[Fig. 3]


Storing Unit
Membership Information DB
Map Information for Golf Course DB
Rounding Information on Golf Course DB
Score Information DB
Other Additional Information DB
5
Course Image and Associated Numerical Value Information Provider
23
Additional Information Provider
24
Controller
20
Transceiver I/F Module
21

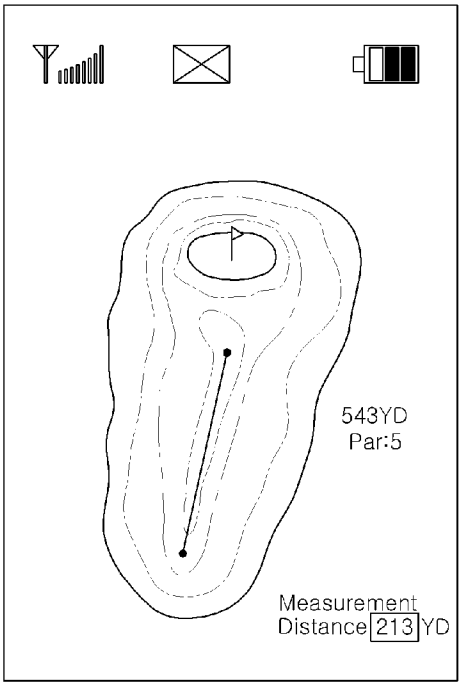
[Fig. 4]


435YD
Par4
Measurement
Distance 213 YD

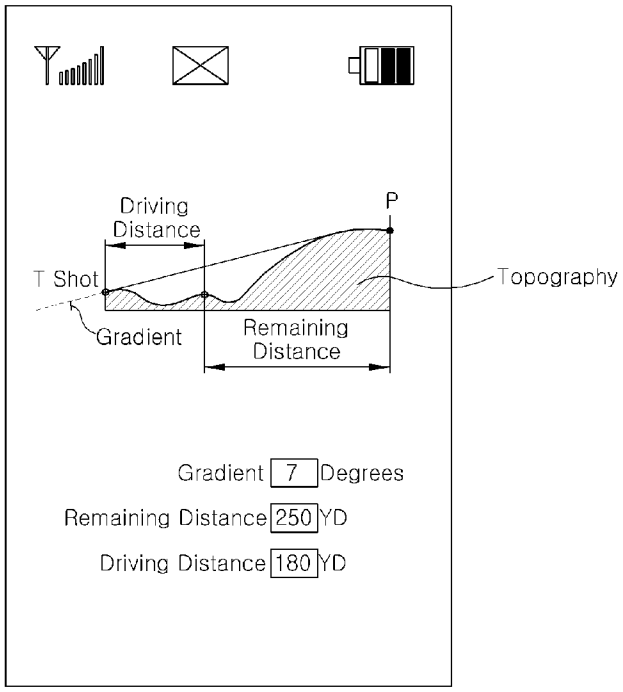
[Fig. 5]


399 386 349 332 311 PAR4
66
65
117
159
180
231
213
204
202
175
38m
Measurement
Distance 250 M

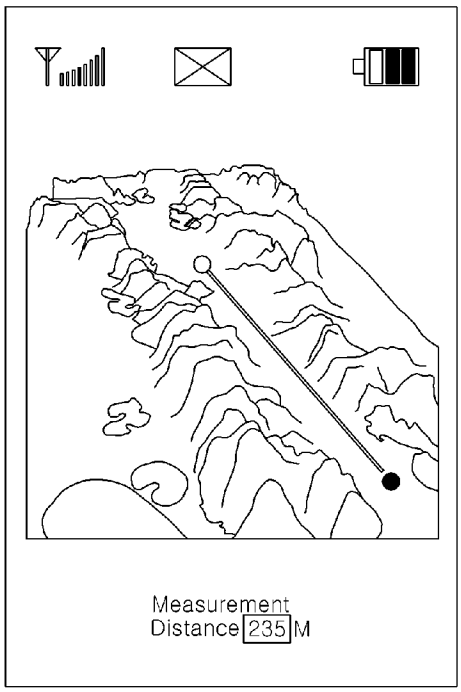
[Fig. 6]


543YD
Par:5
Measurement
Distance 213 YD

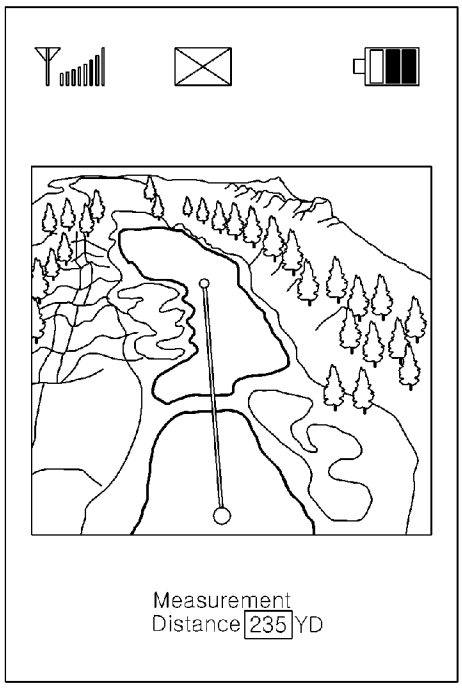
[Fig. 7]


Driving
Distance
P
T Shot
Topography
Gradient
Remaining
Distance
Gradient 7 Degrees
Remaining Distance 250 YD
Driving Distance 180 YD

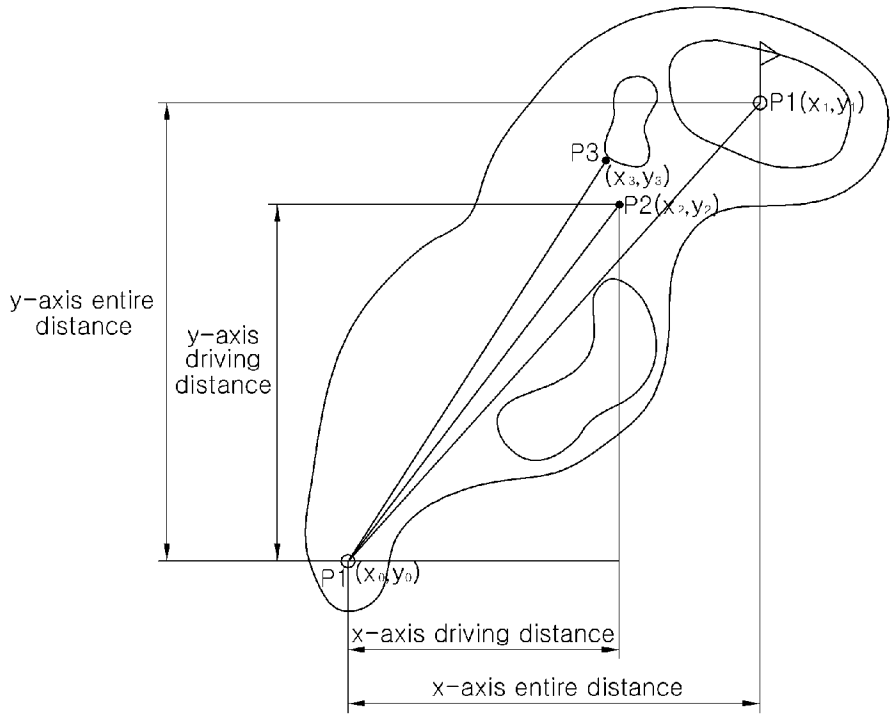
[Fig. 8]


Measurement
Distance 235 M

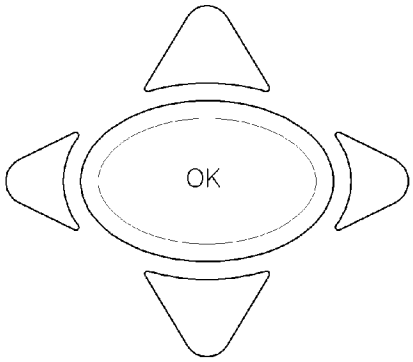
[Fig. 9]


Measurement
Distance 235 YD

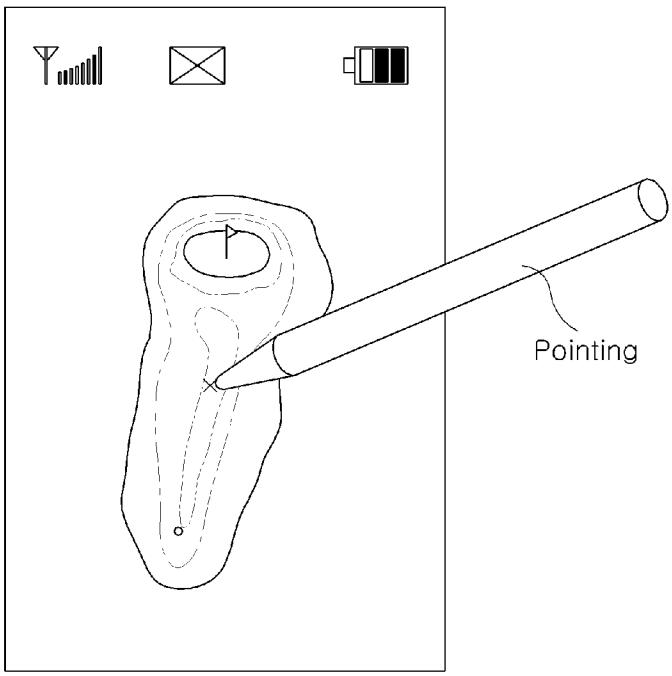
[Fig. 10]


P1(x1,y1)
P3
(x3,y3)
P2(x2,y2)
y-axis entire distance
y-axis driving distance
P1 (x0,y0)
x-axis driving distance
x-axis entire distance

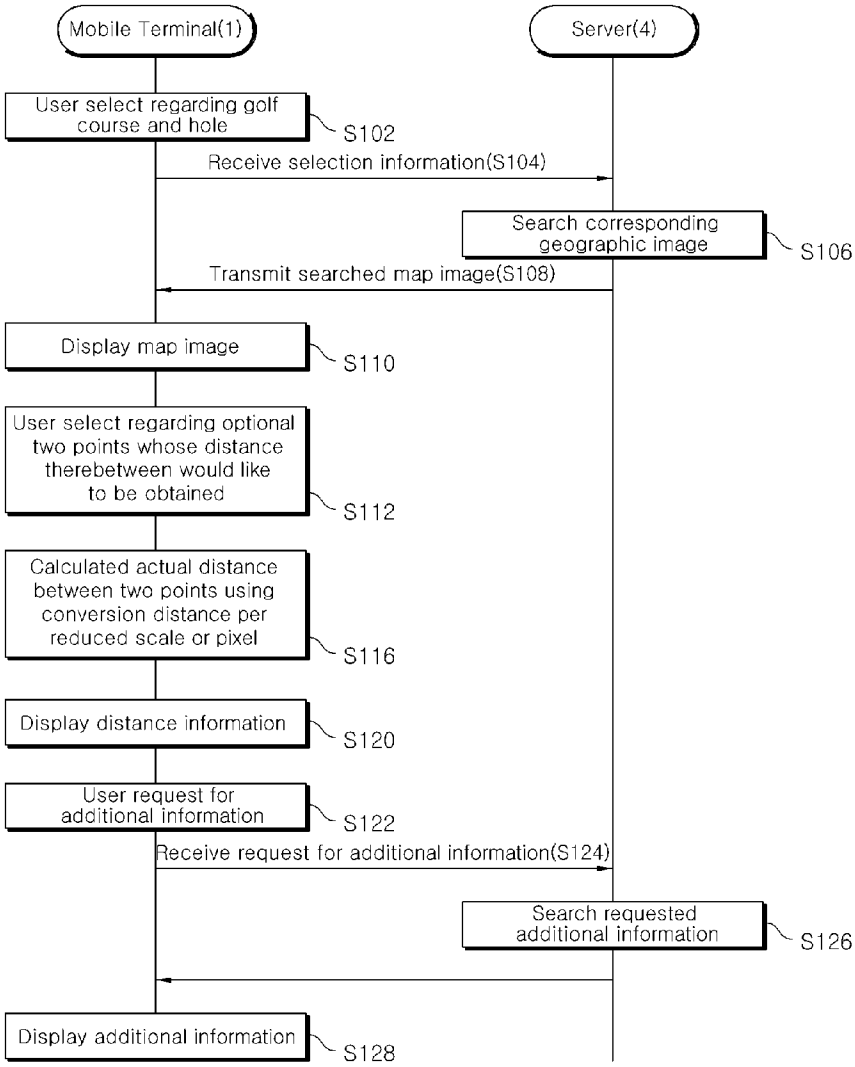
[Fig. 11]



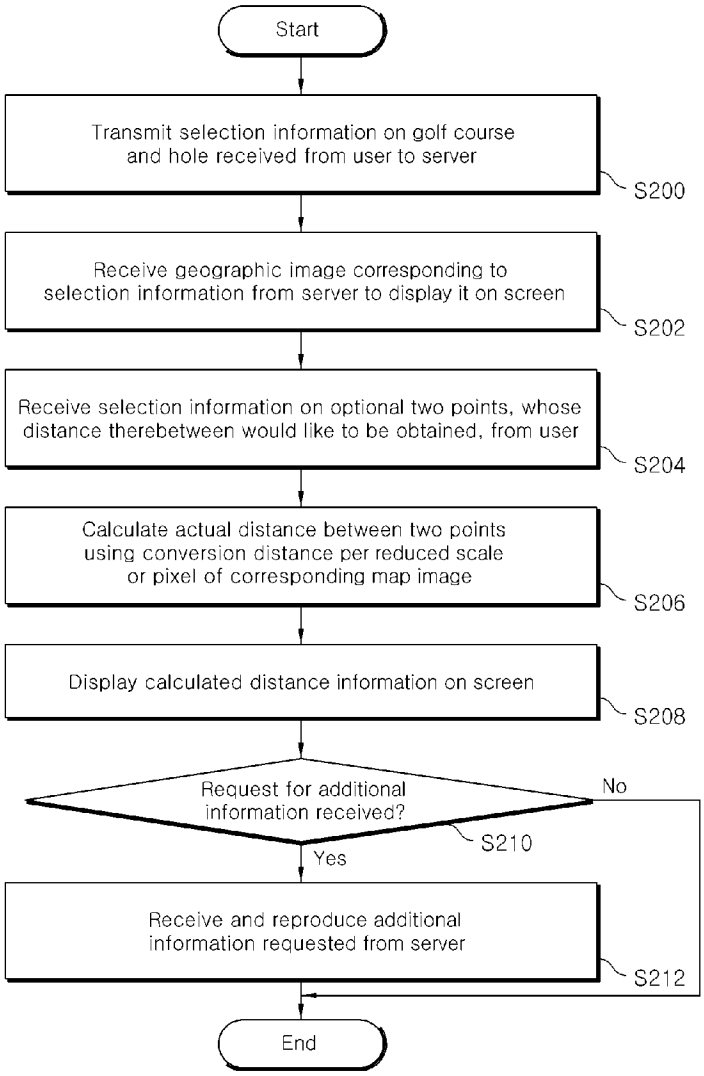
[Fig. 12]



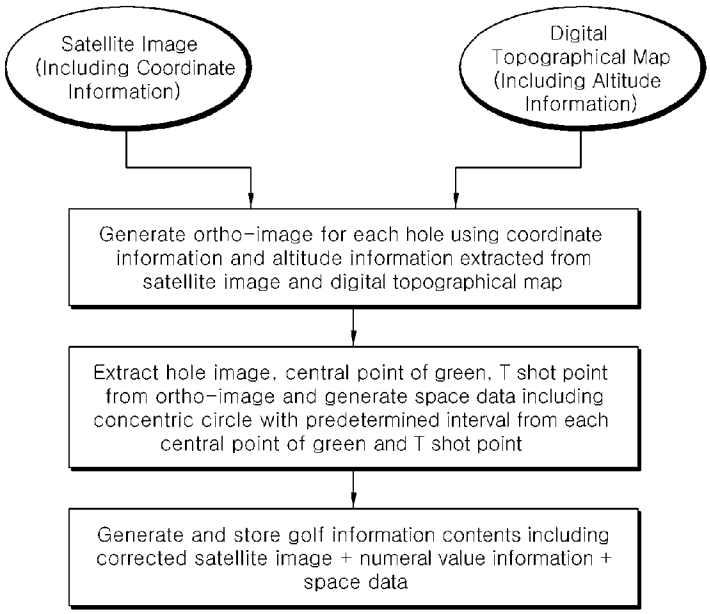
[Fig. 13]


Mobile Terminal(1)
Server(4)
User select regarding golf course and hole
S102
Receive selection information(S104)
Search corresponding geographic image
S106
Transmit searched map image(S108)
Display map image
S110
User select regarding optional two points whose distance therebetween would like to be obtained
S112
Calculated actual distance between two points using conversion distance per reduced scale or pixel
S116
Display distance information
S120
User request for additional information
S122
Receive request for additional information(S124)
Search requested additional information
S126
Display additional information
S128

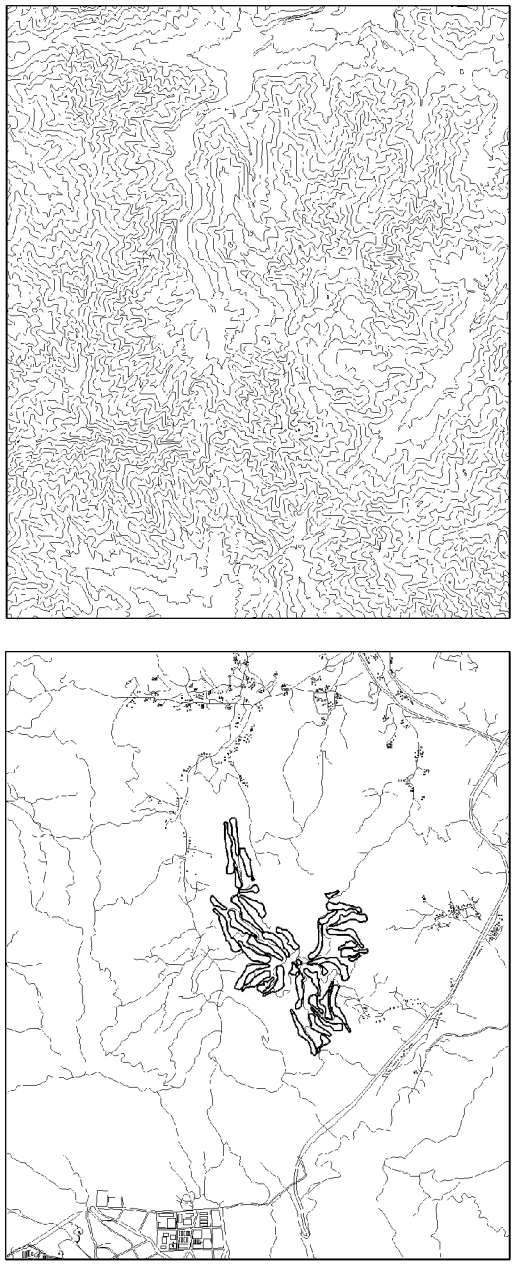
[Fig. 14]


Start
Transmit selection information on golf course and hole received from user to server
S200
Receive geographic image corresponding to selection information from server to display it on screen
S202
Receive selection information on optional two points, whose distance therebetween would like to be obtained, from user
S204
Calculate actual distance between two points using conversion distance per reduced scale or pixel of corresponding map image
S206
Display calculated distance information on screen
S208
Request for additional information received?
S210
No
Yes
Receive and reproduce additional information requested from server
S212
End

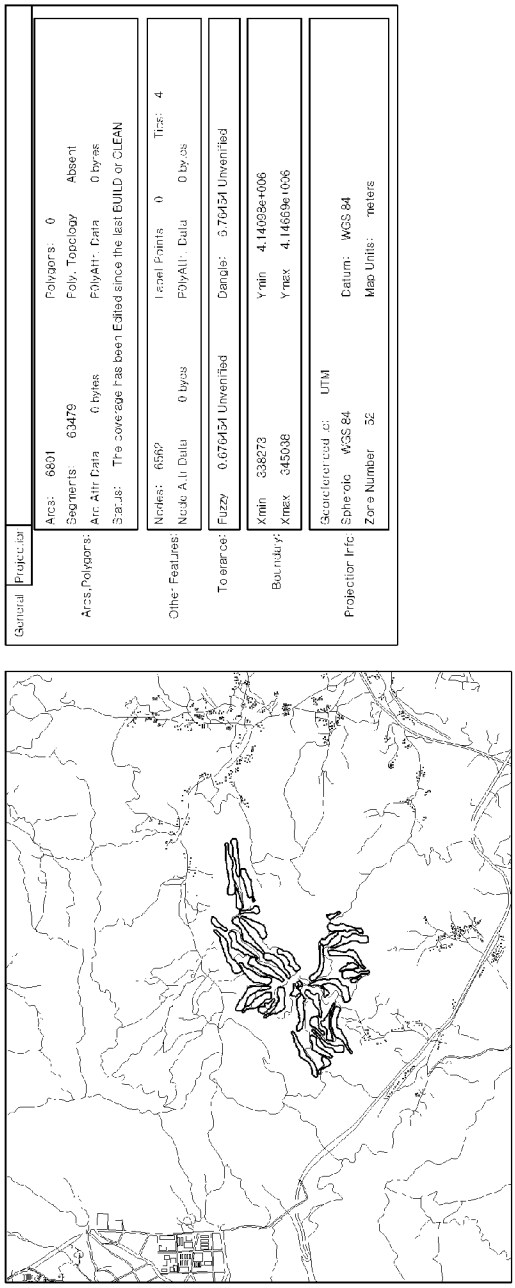
[Fig. 15]


Satellite Image (Including Coordinate Information)
Digital Topographical Map (Including Altitude Information)
Generate ortho-image for each hole using coordinate information and altitude information extracted from satellite image and digital topographical map
Extract hole image, central point of green, T shot point from ortho-image and generate space data including concentric circle with predetermined interval from each central point of green and T shot point
Generate and store golf information contents including corrected satellite image + numeral value information + space data

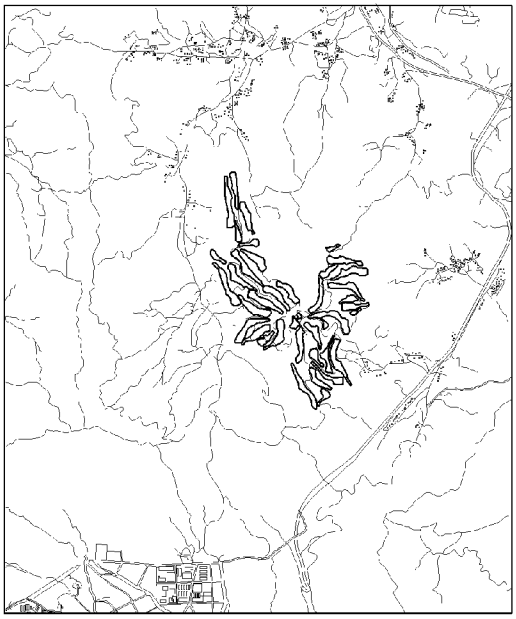
[Fig. 16]



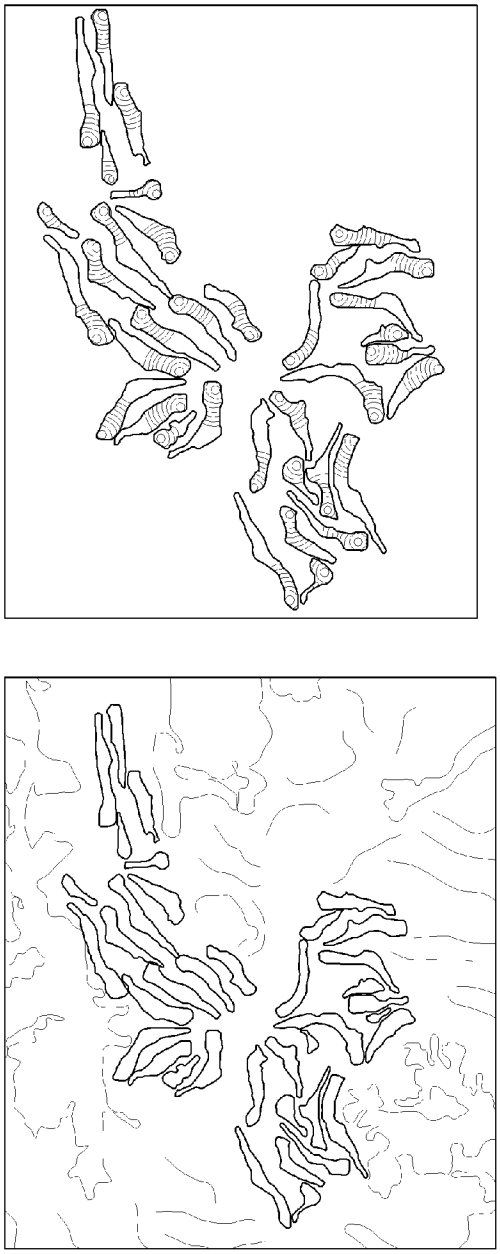
[Fig. 17]


General
Projection
Arcs: 6801
Polygons: 0
Segments: 63479
Poly. Topology: Absent
Arc Attr Data: 0 bytes
PolyAttr Data: 0 bytes
Status: The coverage has been Edited since the last BUILD or CLEAN
Arcs,Polygons:
Nodes: 6562
Label Points: 0
Tics: 4
Node Attr Data: 0 bytes
PolyAttr Data: 0 bytes
Other Features:
Tolerance:
Fuzzy: 0.676454 Unverified
Dangle: 6.76454 Unverified
Boundary:
Xmin: 338273
Ymin: 4.14098e+006
Xmax: 345008
Ymax: 4.14669e+006
Projection Info:
Georeferenced to: UTM
Spheroid: WGS 84
Datum: WGS 84
Zone Number: 52
Map Units: meters

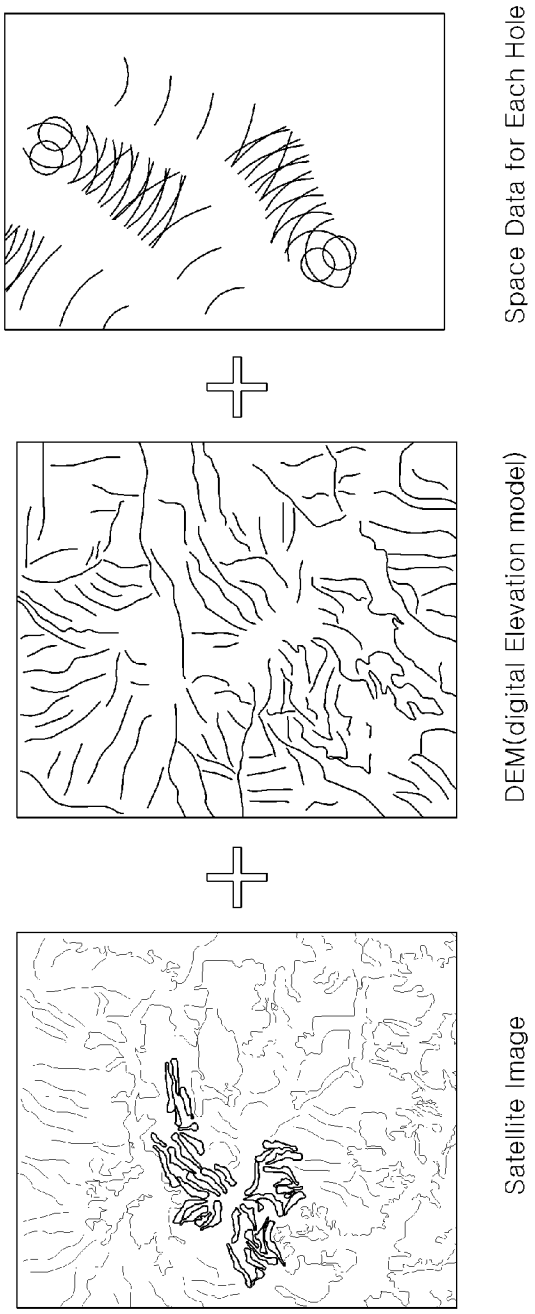
[Fig. 18]



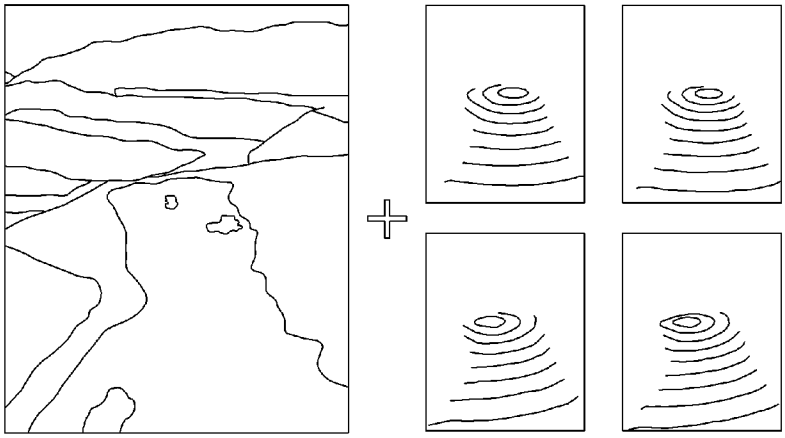
[Fig. 19]



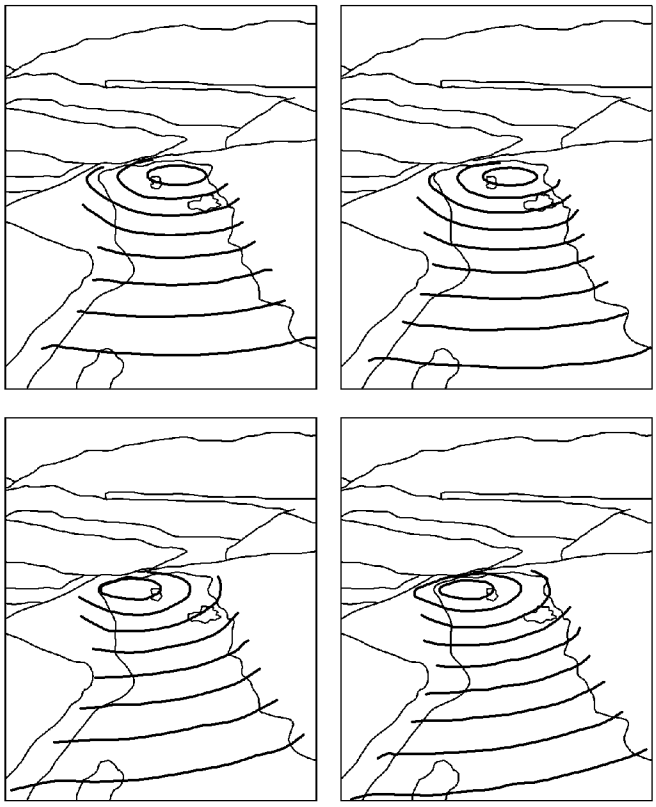
[Fig. 20]


Space Data for Each Hole
DEM(digital Elevation model)
Satellite Image

[Fig. 21]



[Fig. 22]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/001857

A. CLASSIFICATION OF SUBJECT MATTER

H04Q 7/24(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 : H04Q 7/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility Models since 1975

Japanese Utility models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) "Golf","content"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005-0030223 A1 (Tadahiro, N.) 10 Feb. 2005 See abstract, figure 1, and claims 1-12 para. [0010] - [0025], para. [0039] - [0050]	1-16
A	US 2004-0147329 A1 (Meadows, J. W. et al.) 29 Jul. 2004 See abstract, figures 1 and 25, and claims 1, 13, 25 and 44 para. [0008] - [0010], para. [0087] - [0092]	1-16
A	WO 2005-050521 A1 (EZSYNC CO., LTD.) 02 Jun. 2005 See abstract, figure 1, and claims 1-18 page 3, line 20 - page 5, line 14, page 13, line 11 - page 14, line 7	1-16
A	KR 10-2002-0036361 A (KIM, C. I.) 16 May 2002 See abstract, figure 3, and claims 1-5 page 3, line 22 - 41	1-16
A	KR 10-2004-0020201 A (SK TELECOM CO., LTD.) 09 Mar. 2004 See abstract, figures 1 and 2, and claims 1-11 page 2, line 33 - page 3, line 6	1-16

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 JULY 2007 (14.07.2007)	**16 JULY 2007 (16.07.2007)**

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Authorized officer

KIM, Kwang Sik

Telephone No. 82-42-481-8355

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/001857

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