

METHOD AND APPARATUS FOR DISPLAYING WEATHER INFORMATION FOR S-100 BASED ELECTRONIC CHART DISPLAY INFORMATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application No. 10-2016-0152238, filed on November 15, 2016, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

1. Field

[0001] One or more embodiments relate to a method and apparatus for displaying S-412 sea weather information through an S-100 based Electronic Chart Display & Information System (ECDIS).

2. Description of the Related Art

[0002] Since vessels at sea use a satellite network for communication with land stations, a communication bandwidth is limited. Therefore, there is a limit in exchanging large volumes of data with vessels at sea via a general terrestrial Internet network. In particular, it is difficult to transmit a large amount of weather information, which is important for navigation, to vessels at sea in real time. Also, there is a problem in that a large load is generated in a system when vessels at sea process a large amount of weather information.

[0003] As the International Hydrographic Organization (IHO) prohibits a change of the currently used S-57 transfer standard and also has introduced a new standard S-100, it is necessary to exchange information regarding maritime details generated on an Electronic Chart Display & Information System (ECDIS) and display information about maritime weather like never before.

SUMMARY

[0004] One or more embodiments include a method and apparatus for transmitting and receiving S-412 sea weather data without increasing a communication load on a system.

[0005] One or more embodiments include a method and apparatus for displaying weather data in an outline shape such as an isobar line on an S-100 based electronic chart display information system (ECDIS).

[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] According to one or more embodiments, a method of displaying weather information in an S-100 based electronic chart display information system (ECDIS) includes: receiving weather data in unit of grids divided based on latitude and longitude; and overlapping and displaying the weather data on a map, wherein the weather data includes weather values of respective grids in a text form according to a preset order, wherein the displaying includes: mapping the respective grids with respective grid points, and identifying an intersection point that is a point at an edge indicating a position of a sample value to be drawn as a line based on weather values of the weather data corresponding to grid points at both ends of the edge connecting adjacent grid points; and displaying a line connecting intersection points corresponding to the sample value on the map.

[0008] The weather data may be obtained by compressing a section in which the same weather value is continuously repeated and including the weather values of the respective grids in the text form according to the preset order.

[0009] The receiving may include: receiving the weather data via an Internet network using an application program interface (API).

[0010] The identifying of the intersection point may include: comparing a weather value of one of grid points of both ends of each edge and a weather value between the grid points of both ends of each edge with the sample value.

[0011] The identifying of the intersection point may include: searching for a first intersection point having the sample value while sequentially advancing in a preset direction; if the first intersection point is found, identifying whether a second intersection point exists within a certain range in a clockwise or counterclockwise direction with

respect to an edge where the first intersection point is found; and if the second intersection point exists, repeatedly identifying whether a third intersection point exists within a certain range in the same direction as a search direction of the second intersection point with respect to the edge where the second intersection point is found until the first intersection point is reached.

[0012] The respective grid points may be mapped to information of respective grids and coordinate values of respective grids, wherein each edge is mapped to information of grid point located at both ends of the each edge, information of intersection point having the sample value, and intersection use information indicating whether the intersection points are used for drawing the line, and wherein the identifying of the intersection point includes identifying an intersection point that is not used based on the intersection use information.

[0013] According to one or more embodiments, an electronic chart display information system (ECDIS) includes a receiving unit configured to receive weather data in unit of grids divided based on latitude and longitude; and a display unit configured to overlap and display the weather data on a map, wherein the display unit includes: an intersection point identifying unit configured to map respective grids with respective grid points, and to identify an intersection point that is a point at an edge indicating a position of a sample value to be drawn as a line based on weather values of the weather data corresponding to grid points at both ends of the edge connecting adjacent grid points; and a display unit configured to display a line connecting intersection points corresponding to the sample value on the map.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] These and/or other aspects will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

[0015] FIG. 1 is a diagram showing a schematic structure of an overall system to which the present disclosure is applied;

[0016] FIG. 2 is a diagram showing an example of weather data according to the present disclosure;

[0017] FIG. 3 is a diagram illustrating an example of a method of reducing a size of weather data according to the present disclosure;

[0018] FIG. 4 is a diagram showing a configuration of a weather information providing apparatus according to an embodiment of the present disclosure;

[0019] FIG. 5 is a diagram showing a configuration of an S-100 based electronic chart display information system (ECDIS) according to an embodiment of the present disclosure;

[0020] FIG. 6 is a diagram illustrating an example of S-412 sea weather data expressed via grid points and edges according to an embodiment of the present disclosure;

[0021] FIG. 7 is a diagram illustrating an example of a method of connecting intersection points of an edge and connecting a line according to an embodiment of the present disclosure;

[0022] FIG. 8 is a diagram showing an example of information associated with a grid point and an edge according to an embodiment of the present disclosure;

[0023] FIGS. 9 and 10 are diagrams showing an example of an intersection search method according to an embodiment of the present disclosure;

[0024] FIG. 11 is a flowchart showing an example of a method of displaying weather information on an ECDIS according to an embodiment of the present disclosure; and

[0025] FIG. 12 is a flowchart illustrating an example of a method of displaying weather information in the form of an outline on an S-100 based ECDIS according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0026] Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the present embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein.

Accordingly, the embodiments are merely described below, by referring to the figures, to explain aspects of the present description.

[0027] Hereinafter, a method and apparatus for displaying weather information of S-412 for an S-100 based electronic chart display information system (ECDIS) according to embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0028] FIG. 1 is a diagram showing a schematic structure of an overall system to which the present disclosure is applied.

[0029] Referring to FIG. 1, a weather information providing apparatus 110 receives weather data from a weather station 100 via a wired/wireless communication network, and provides the weather data to vessels 130 and 132. The weather information providing apparatus 110 may be implemented as a cloud 120.

[0030] Although the present embodiment shows one weather station 100, a subject providing weather data may vary. According to another embodiment, if the weather information providing apparatus 110 directly generates weather data, the weather information providing apparatus 110 may not include a configuration for receiving the weather data from the outside of the weather station 100 or the like.

[0031] The weather information providing apparatus 110 located on land and the vessels 130 and 132 at sea are connected through wireless communication. However, since communication facilities such as a base station may not be installed at sea, it is difficult to receive a communication signal directly from the land if a vessel is not close to land. Thus, the vessels 130 and 132 and the weather information providing apparatus 110 transmit and receive data through a very small aperture terminal (VSAT) satellite communication network. In addition, various communication methods may be used for communication between the weather information providing apparatus 110 and the vessels 130 and 132.

[0032] Since communication between the weather information providing apparatus 110 and the vessels 130 and 132 is limited by a bandwidth, etc., the weather data provided by the weather information providing apparatus 110 to the vessels 130 and 132 is in the form of text other than large-capacity data in the form of images.

[0033] FIG. 2 is a diagram showing an example of weather data 230 according to the present disclosure.

[0034] Referring to FIG. 2, the weather data 230 includes weather values 240 in units of grids divided on the basis of latitude and longitude. For example, if the earth is represented via a one-dimensional plane map 200 divided into 181 latitudes and 360 longitudes, a total of 65,160 grids 210 are generated.

[0035] The weather data 230 may include various weather values such as temperature, atmospheric pressure, wave, humidity, wind speed, and the like. For example, the weather data 230 for the temperature includes a temperature weather value for each grid, and the weather data 230 for the atmospheric pressure includes an atmospheric pressure weather value for each grid. In another embodiment, one piece of the weather data 230 may include a plurality of pieces of weather information such as temperature, atmospheric pressure, and the like for each grid.

[0036] In order to reduce data amount, the weather data 230 includes the weather values 240 such as temperature, atmospheric pressure, etc. for each grid in a text form other than an image form. Even if the weather values 240 are in a text form, a size of the weather data 230 is several hundreds KByte (for example, 420 KB). Since all different weather values such as temperature, atmospheric pressure, wave, humidity, etc. should be provided to a vessel, the size of all data provided to the vessel is several to several tens of MByte (= weather data size * number of types of weather values). That is, when a size of one piece of weather data is 420 KB, an amount of transmission of weather data for the temperature and weather data for the atmospheric pressure is 820 KB in total. The more types of weather values, the more data the vessel receives, and thus, a load on a satellite communication network used by the vessel may increase.

[0037] FIG. 3 is a diagram illustrating an example of a method of reducing a size of weather data 300 according to the present disclosure.

[0038] Referring to FIG. 3, the weather data 300 does not include information about a grid and may include only weather values of respective grids according to a preset order. For example, the weather data 300 may sequentially include the weather values for the respective grids in the right-to-left, upper-to-lower direction from the upper right to the lower left on a map shown in FIG. 2. In this case, information relating to the order of

weather values included in the weather data 300 is previously set between an S-100-based electronic chart display information system (ECDIS) of the vessels 130 and 132 and the weather information providing apparatus 110.

[0039] In another embodiment, the weather data 300 may further include information (a grid identifier, or a coordinate value (a center coordinate value, etc.) of a specific location of a grid, etc.) about grids associated with respective weather value in addition to the weather values. For ease of explanation, it is assumed in the present embodiment that the weather data 300 includes the weather values of the respective grids in a preset order.

[0040] The weather data 300 includes weather values representing weather of the entire earth in units of grids as shown in FIG. 2. The weather values between adjacent grids may be the same. That is, the same weather value may be repeatedly continuously included in the weather data 300.

[0041] The weather information providing apparatus 110 may not perform a redundant transmission of the continuously repeated weather value in the weather data 300, and may add and transmit only information about a redundant range. For example, if a first weather value a_k 302 is repeated twice, a second weather value a_{k+1} 304 is repeated twice, and a third weather value a_{k+2} 306 is repeated three times in the weather data 300, the weather information providing apparatus 110 skips repeated weather values and transmits compressed weather data 310 including information 313, 315, and 317 in which a first weather value 312, a second weather value 314, and a third weather value 316 are repeated twice, twice, and three times, respectively, to the vessels 130 and 132. The present embodiment is an example for helping understanding compression of the weather data 300, and the present disclosure is not limited thereto. Various other conventional methods of compressing continuously repeated data may be applied.

[0042] FIG. 4 is a diagram showing a configuration of the weather information providing apparatus 110 according to an embodiment the present disclosure.

[0043] Referring to FIG. 4, the weather information providing apparatus 110 includes a data receiving unit 400, a data compressing unit 410, and a data transmitting unit 420.

[0044] The data receiving unit 400 receives weather data from various servers that generate and provide weather information such as a weather station, etc. The weather

data received by the data receiving unit 400 may or may not be the weather data 230 in units of a grid as shown in FIG. 2. If the weather data received by the data receiving unit 400 is not the weather data 230 in units of a grid as shown in FIG. 2, the data receiving unit 400 divides the world into the grids 210 as shown in FIG. 2, extracts weather values representative of the grids 210, and generates the weather data 230 in the grid 210. For example, if a plurality of temperature values exist in one grid when weather data is generated with respect to temperature, the data receiving unit 400 extracts an average of the plurality of temperature values in the grid as a weather value of the grid and generate the weather data 230. A weather value of each grid may be determined using other various methods.

[0045] The data compressing unit 410 compresses the continuously repeated weather values in the weather data 230 expressed in the text form as shown in FIG. 2. For example, the data compressing unit 410 may generate the weather data 310 compressed using the information 313, 315, and 317 indicating ranges of continuously repeated values as shown in FIG. 3.

[0046] The data transmitting unit 420 transmits the compressed weather data 310 to a vessel through a satellite communication network or the like. The data transmitting unit 420 may transmit and receive data to and from the vessel through the Internet using an application program interface (API). The API makes it possible to transmit and receive weather data to and from a display device located in the vessel using HyperText Transfer Protocol (HTTP) based Simple Object Access Protocol (SOAP) and REpresentational State Transfer (REST).

[0047] FIG. 5 is a diagram showing a configuration of an S-100 based electronic chart display information system (ECDIS) 500 according to an embodiment the present disclosure.

[0048] Referring to FIG. 5, the S-100 based ECDIS 500 includes a receiving unit 510, a display unit 520, and a database 530. The S-100 based ECDIS 500 according to the present embodiment is a display device located in a vessel, and may be implemented as another electronic navigation chart (ENC)-based system.

[0049] The receiving unit 510 receives weather data from the weather information providing apparatus 110 and stores the weather data in the database 530. The display unit 520 overlaps the weather data on a map and displays the weather data.

[0050] The display unit 520 may display a weather value in the text form of the weather data on a position of each grid on the map as it is. However, when the weather value in the text form is displayed as it is, since readability thereof is low, the display unit 520 may convert a weather value such as a temperature and an atmospheric pressure into an outline form such as an isotherm or an contour line. Since the receiving unit 510 receives various types of weather data such as temperature, atmospheric pressure, wave, and wind speed from the weather information providing apparatus 110, the display unit 520 may overlap and display these weather values on the map or may select only a predetermined weather value according to a selection of a user to overlap and display the selected weather value on the map.

[0051] The display unit 520 includes an intersection point identifying unit 522 and an image display unit 524 in order to display a weather value in units of grids of the weather data in an outline form.

[0052] The intersection point identifying unit 522 identifies intersection points of sample values located at edges connecting respective grid points which is mapped to respective grids. Since the weather data expresses weather values of respective grids in the text form, an outline such as isotherms may not be directly derived based on the weather values. Therefore, the intersection point identifying unit 522 generates grid points 660, 670, and 680 representing grids 610, 620, and 630 in dots as shown in FIG. 6, and generates an edge 690 connecting the grid points 660, 670, and 680. The intersection point identifying unit 522 identifies a point in an edge where a sample value (for example, 10 degrees when searching for a 10 degree isotherm) is located as an intersection point by using weather values of the grid points 660 and 670 located at both ends of the edge 690.

[0053] The image display unit 524 overlaps and displays a line obtained by connecting intersection points of the same sample values identified by the intersection point identifying unit 522 on the map. For example, when it is desired to determine the isotherm at intervals of 10 degrees, the intersection point identifying unit 522 identifies

respective intersection points with respect to respective sample values such as "...- 30, -20, -10, 0, 10, 20, 30 ...". The image identifying unit 524 overlaps and displays a line connecting the intersection points corresponding to the respective sample values on the map. That is, processes of identifying and connecting intersection points corresponding to the sample value of 10 degrees and identifying and connecting intersection points corresponding to the sample values of 20 degrees are performed.

[0054] A specific example in which the intersection point identifying unit 522 identifies intersection points and a specific example in which the image display unit 524 identifies a line by connecting the intersection points will be described again with reference to FIG. 6 through 10.

[0055] FIG. 6 is a diagram illustrating an example of S-412 sea weather data expressed via grid points and edges according to an embodiment of the present disclosure.

[0056] Referring to FIG. 6, weather data includes weather values of the respective grids 610, 620, and 630, which are divided based on the latitude and longitude, on the map 600 in a text form. The present embodiment introduces a concept 650 regarding the grid points 660, 670, and 680 and the edge 690 to create an outline based on the weather values.

[0057] The grid points 660, 670, and 680 respectively correspond to the grids 610, 620, and 630 indicating a region divided by latitude and longitude. The edge 690 is a line segment connecting the grid points 660 and 670. Accordingly, the edge 690 has a value between the weather values represented by the grid points 660 and 670 at both ends, and may determine whether a sample value exists in the edge 690 based on the weather values represented by the grid points 660 and 670 at both ends of the edge 690.

[0058] For example, when intersection points having sample value of temperature of 10 degrees is identified, if the weather values represented by the grid points 660 and 670 at both ends of the edge 690 are 9 degrees and 11 degrees, respectively, the intersection point is an intermediate point of the edge 690. If the weather values represented by the grid points 660 and 670 at both ends of the edge 690 are 11 degrees and 12 degrees, there is no intersection point of the sample value at the edge 690.

[0059] There may be several isotherms on an entire map. Not only isotherms representing different temperatures, but also isotherms representing the same temperature, for example, temperature of 10 degrees, may be present in many places on the map, and these isotherms should not cross each other.

[0060] In order to prevent outlines from crossing each other, it is preferable that only one of the weather values of the grid points 660 and 670 at both ends of the edge 690 is used for determining whether a sample value exists. For example, when the edge 690 is defined to include only the weather value of the left grid point 660, if the weather value of the left grid point 660 of the edge 690 is 11 degrees and the right grid point 670 are 12 degrees, an intersection point of the sample value of 11 degrees exists at the edge 690, but there is no intersection point of the sample value of 12 degrees.

[0061] FIG. 7 is a diagram illustrating an example of a method of connecting intersection points of an edge and connecting a line according to an embodiment of the present disclosure.

[0062] Referring to FIG. 7, an S-100-based ECDIS connects intersection points of each edge to obtain a closed outline 700. Although the present embodiment shows for convenience of explanation one closed outline 700 connecting the intersection points, a plurality of outlines may exist.

[0063] According to an embodiment, initially, the intersection point with respect to a plurality of sample values may be identified at the same time. For example, when intersection points with respect to two sample values for 5 degrees and 10 degrees are identified simultaneously, there may be two intersection points (i.e., intersection points of samples of 5 degrees and 10 degrees) at one edge. In this case, the ECDIS may store and manage information about the intersection points existing at each edge in the manner as shown in FIG. 8.

[0064] FIG. 8 is a diagram showing an example of information associated with a grid point and an edge according to an embodiment of the present disclosure.

[0065] Referring to FIG. 8, the grid point is mapped to information of a corresponding grid (e.g., grid identification information), grid coordinates (e.g., geographical coordinates representing a center of the grid), information of neighboring grid points (e.g., grid point identification information), information about connected edges (e.g.,

edge identification information), and the like and is stored in the database 530. For example, a general grid point is adjacent to four grid points located at the upper, lower, left, and right sides, and there are edges connected to four neighboring grid points. Information about such connection relationship is stored in the database 530 together with the grid points.

[0066] The edge is mapped to information (e.g., grid point identification information) of grid points located at both ends, intersection point information (e.g., intersection point position information, information of associated sample values, etc.), intersection point use information (e.g. flag information indicating whether the intersection point is used) and is stored in the database 530. If a plurality of intersection points for different sample values exist at the edge, it is preferable that the intersection point use information exists for each intersection point.

[0067] The S-100-based ECDIS changes the intersection point use information of the corresponding edge where the intersection point is located to 'use' when the intersection point is used for line creation, thereby preventing the same intersection point from being used later for generating different outlines.

[0068] For example, to create a 10 degree isotherm, the S-100-based ECDIS determines whether there is an intersection point of a 10 degree sample value for each edge, and displays and stores it as 'unused' in the intersection point use information together with the intersection point information. If any one of 10-degree isotherms is created by searching for an intersection point through search processes of FIGS. 9 and 10 that will be described below, the intersection point use information is changed to 'use' so that the intersection point used thereon is not used again in the future. The S-100-based ECDIS generates another outline using an intersection point that is "unused" except for the intersection points already used.

[0069] FIGS. 9 and 10 are diagrams showing an example of an intersection search method according to the present disclosure.

[0070] Referring to FIG. 9, in order to prevent outlines from being generated in an 8-character form or two outlines from intersecting each other, an S-100-based ECDIS sequentially searches for edges and detects intersection points in a predetermined order. For example, the S-100-based ECDIS searches for an intersection point having

sample value sequentially from a first line 910 at the top to next lines 920 and 930. Although the present embodiment shows a sequential search in a horizontal direction, a search direction such as a sequential search in a vertical direction may be variously modified according to an embodiment.

[0071] When the S-100-based ECDIS first finds an intersection point 940 of sample value, the ECDIS stops a further searching process and performs a search process of an additional intersection using a method of FIG. 10.

[0072] Referring to FIG. 10, the S-100-based ECDIS searches for a second intersection point of sample value in a preset direction (for example, clockwise or counterclockwise) with respect to an edge within a certain range based on an initially found first intersection point. For example, if a first intersection 1000 exists at an edge in the horizontal direction, the S-100-based ECDIS sequentially searches for 8-character peripheral edges from a preset position to identify the second intersection. If a first intersection 1010 exists at the edge in a vertical direction, the S-100-based ECDIS sequentially searches for lying 8-character peripheral edges from a preset position to identify the second intersection.

[0073] When the second intersection point is searched for, the S-100-based ECDIS again searches for a third intersection point using the method shown in FIG. 10 based on the edge where the second intersection point is located. The S-100-based ECDIS repeats the intersection search process continuously until the initially found first intersection point in this way is searched for again. If a result of the intersection search is the same as in FIG. 7, the S-100-based ECDIS overlaps and displays lines connecting respective intersection points on a map. If an intersection point relates to a sample value of temperature of 10 degrees, the map displays an isotherm for temperature of 10 degrees.

[0074] When one isotherm is completed, the S-100-based ECDIS again searches for an intersection point of the sample value using the method of FIG. 9. When a first intersection point of the sample value is found, a next intersection point is searched for using the method of FIG. 10 as described above. In this case, 'intersection point use information' described in FIG. 8 may be utilized so that intersections used in the previously generated isotherm are not reused.

[0075] FIG. 11 is a flowchart showing an example of a method of displaying weather information on an S-100-based ECDIS according to an embodiment of the present disclosure.

[0076] Referring to FIG. 11, the S-100-based ECDIS receives weather data from a weather information providing apparatus (S1100). The weather data includes weather values of respective grids, which are classified on the basis of latitude and longitude, in the form of text as shown in FIG. 2. According to an embodiment, the S-100-based ECDIS may receive compressed weather data as shown in FIG. 3, instead of directly receiving the entire weather data as shown in FIG. 2. When the compressed weather data is received, the S-100-based ECDIS reconstructs data of a compressed portion to generate original weather data as shown in FIG. 2.

[0077] The S-100-based ECDIS overlaps and displays the weather data on a map. The S-100-based ECDIS may display the weather values in the form of text of the weather data as they are on the corresponding grid portion of the map or convert and display the weather values into lines such as an isotherm or an isobar line.

[0078] FIG. 12 is a flowchart illustrating an example of a method of displaying weather information in the form of an outline on an S-100 based ECDIS according to an embodiment of the present disclosure.

[0079] Referring to FIG. 12, the S-100-based ECDIS generates grid points and edges based on respective grids forming weather data as shown in FIG. 6 (S1200). The S-100-based ECDIS may store information about the grid points and the edges in a database as shown in FIG. 8.

[0080] The S-100-based ECDIS identifies intersection points of sample values based on the respective weather values indicated by the grid points at both ends of the edges (S1210). For example, if isotherms are drawn at 10-degree intervals, the S-100-based ECDIS identifies which locations of the edges sample values of 10-degree intervals are present. The S-100-based ECDIS creates lines connecting the identified intersection points (S1220), and overlaps and displays the lines on a map (S1230).

[0081] The present disclosure may also be embodied as computer readable code on a computer readable recording medium. A computer-readable recording medium includes all kinds of recording apparatuses in which data that may be read by a computer system

is stored. Examples of the computer-readable recording medium include ROM, RAM, CD-ROM, magnetic tape, floppy disk, optical data storage, and the like. The computer-readable recording medium may also be distributed over a networked computer system so that computer readable code may be stored and executed in a distributed manner.

[0082] According to the present disclosure, it is possible to prevent transmission of repeated weather data while transmitting weather data of S-412 standard on a grid basis, thereby reducing an entire amount of data to be transmitted. Also, weather data in the form of text may be easily overlapped and displayed on an electronic navigation chart in the form of an outline such as an isotherm, etc.

[0083] It should be understood that the embodiments described herein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each embodiment should typically be considered as available for other similar features or aspects in other embodiments.

[0084] While one or more embodiments have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the inventive concept as defined by the following claims.

WHAT IS CLAIMED IS:

1. A method of displaying weather information in an S-100 based electronic chart display information system (ECDIS), the method comprising:

5 receiving weather data in unit of grids divided based on latitude and longitude;
and

overlapping and displaying the weather data on a map,
wherein the weather data comprises weather values of respective grids in a text form according to a preset order,

10 wherein the displaying comprises:

mapping the respective grids with respective grid points, and identifying an intersection point that is a point at an edge indicating a position of a sample value to be drawn as a line based on weather values of the weather data corresponding to grid points at both ends of the edge connecting adjacent grid points; and

15 displaying a line connecting intersection points corresponding to the sample value on the map.

2. The method of claim 1, wherein the weather data is obtained by compressing a section in which the same weather value is continuously repeated and comprising the weather values of the respective grids in the text form according to the
20 preset order.

3. The method of claim 1, wherein the receiving comprises:
receiving the weather data via an Internet network using an application program
25 interface (API).

4. The method of claim 1, wherein the identifying of the intersection point comprises:

30 comparing a weather value of one of grid points of both ends of each edge and a weather value between the grid points of both ends of each edge with the sample value.

5. The method of claim 1, wherein the identifying of the intersection point comprises:

searching for a first intersection point having the sample value while sequentially advancing in a preset direction;

5 if the first intersection point is found, identifying whether a second intersection point exists within a certain range in a clockwise or counterclockwise direction with respect to an edge where the first intersection point is found; and

if the second intersection point exists, repeatedly identifying whether a third intersection point exists within a certain range in the same direction as a search direction of the second intersection point with respect to the edge where the second intersection point is found until the first intersection point is reached.

6. The method of claim 1, wherein the respective grid points are mapped to information of respective grids and coordinate values of respective grids,

15 wherein each edge is mapped to information of grid point located at both ends of the each edge, information of intersection point having the sample value, and intersection use information indicating whether the intersection points are used for drawing the line, and

wherein the identifying of the intersection point comprises identifying an intersection point that is not used based on the intersection use information.

7. An electronic chart display information system (ECDIS) comprising:

a receiving unit configured to receive weather data in unit of grids divided based on latitude and longitude; and

25 a display unit configured to overlap and display the weather data on a map, wherein the display unit comprises:

an intersection point identifying unit configured to map respective grids with respective grid points, and to identify an intersection point that is a point at an edge indicating a position of a sample value to be drawn as a line based on weather values of the weather data corresponding to grid points at both ends of the edge connecting adjacent grid points; and

a display unit configured to display a line connecting intersection points corresponding to the sample value on the map.

8. A non-transitory computer-readable recording medium having recorded
5 thereon a program for executing the method of claim 1 on a computer.