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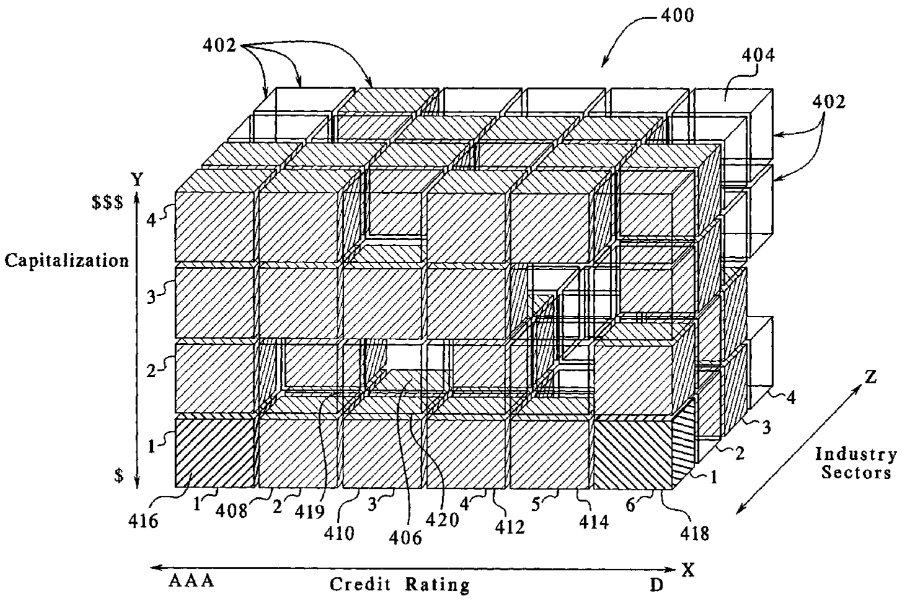
(54) Title: MULTIDIMENSIONAL DATABASE ANALYSIS TOOL



(57) **Abstract:** The invention includes a multidimensional database analysis tool. The tool may be formed by amethod that includes gathering data for objects, each object having three variables and an object image based on one of the three variables. Data may be supplied to the three variables of each object where the three variables of each object may be associated as individual members of a coordinate number set. The coordinate number set of each object may be compared with the coordinate number set of each remaining object so as to produce an outcome. From this outcome, the objects may be incorporated into a three dimensional object cluster at a particular coordinate within the object cluster.

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MULTIDIMENSIONAL DATABASE ANALYSIS TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of the invention may include knowledge processing and coordination through organizational information models. Through simulation and visualization, the invention may have the purpose of facilitating decisions, creating new views of existing data, and incorporating new variables of data into a common environment by graphically representing user selected, database variables in a multidimensional structure through an electronic medium over dynamic conditions.

2. Background Information

Stock portfolio managers generally desire to spot trends or anomalies within stocks of a particular industry, such as the automotive industry, to make buy or sell decisions. Early on, these stock portfolio managers received information about these stocks on a serially printed ticker tape. With the advent of computers, electronic spreadsheets have been used to present stock portfolio managers with a grid of numerical information that could be updated overtime. To some degree, these spreadsheets permitted stock portfolio managers to spot trends or anomalies within data that changes over time. Others, such as insurance companies, research labs, and the federal government, have employed spreadsheets to spot trends or anomalies within data that changes over time.

With the rapid growth of information data in just about all professions and industries, data has became too voluminous and changes too rapidly over time to make any meaningful decisions based on a grid of numbers, even when that grid of numbers is a collection of data that conveys information when viewed in relationship to three or more variables. What is needed is a multidimensional, simplified presentation of large compilations of data that may be displayed on a desktop as part of a live or static down load of information.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates object 100 of the invention;

Figure 2 illustrates spreadsheet 200 of the invention;

Figure 3 represents method 300 of the invention;

Figure 4 illustrates object cluster 400 of the invention;

Figure 5 illustrates method 500 of the invention;

Figure 6A illustrates object cluster 602, where each object 604 in object cluster 602 is a sphere such that each point on face 606 of each object 604 is equidistant from a center point. Here, object 604 includes one relational face;

Figure 6B illustrates object cluster 608, where each object 610 in object cluster 608 is dihedral; and

Figure 6C shows object cluster 612, where each object 614 in object cluster 612 is a decahedron.

DETAILED DESCRIPTION OF THE INVENTION

I. Object

Figure 1 illustrates object 100 of the invention. Object 100 may be a three dimensional graphical user device, such as a display or interface device. A graphical user display device may be a light based image that presents a dynamic, visual interpretation of large quantities of changing data to a computer user so as to permit that user to track, analyze, and make decision regarding that data. This three dimensional light based image may be generated against a two dimensional computer screen or within three dimensional space, such as through holographic techniques.

The presentation of data through object 100 may be thought of as a false or figurative translation of that information residing in the computer database. Towards this, object 100 may be generated by computer software and may permit a computer user to manipulate data through a database manager software of a computer operating system.

Included with object 100 may be a plurality of faces 102 and edges 104. For example, object 100 may be a cube having six faces. The edges of the cube may be sharp, without curvature, or smooth, like the edges of a dice. A single face, such as face 106, may be that area enclosed within edges, such as edges 108, 110, 112, and 114. One or more faces 102 may present an image to the user through a monitor, such as a computer monitor. **Figure 1** illustrates face image 118 as presented in face 106.

In the area of computer science, real world information may be characterized by data where that data may be translated by a first computer into numbers. These numbers may then be transmitted to a local or remote location so as to activate the red, green, and blue guns in a color cathode ray tube of the first computer or a second computer. This, in turn, may convert the numbers into an image, such as face image 118.

Face image 118 may present a picture of multiple colors or a single color. Color may be viewed as the appearance of face image 118 described in terms of an individual's perception of face image 118. This may involve the three coordinates of hue, saturation, and brightness (HSB model). Other systems for representing colors as ordered sets of numbers that may be used include Red-Green-Blue (RGB), Cyan-Magenta-Yellow (CMY), and Cyan-Magenta-Yellow-Key (CMYK).

As a particular gradation of color, hue may be viewed as the property of a color by which it can be perceived as ranging from red through yellow, green, and blue. This, in turn, may be determined by the dominant wavelength of the light transmitted from a computer monitor. Saturation (or intensity) may be viewed as the vividness of hue; the degree of difference from a gray of the same lightness or brightness. Brightness may be viewed as the effect or sensation by which an observer is able to distinguish differences in luminance along a black-to-white continuum that may range from very dim (dark) to very bright (dazzling).

A color of face image 118 may be different from a color of each of the remaining face images on faces 102. Moreover, at a given moment in time, face image 118 may vary over face 106.

Faces 102 sharing an edge 104 may display a similar image. Where these similar images arising from kinship, the corresponding faces may be referred to as relational faces. Accordingly, one or more of the remaining faces 102 may present an image that may be related to face image 118, the collective of which may be referred to as object image 120.

Object image 120 may serve to represent one or more variables of an object, either individually or collectively. For example, a business enterprise, such Corporation A, may be characterized by variables such as rate of return, capitalization, and the industry by which the business is classified. In this example, object image 120 may represent the collective of return rate, capitalization, and industry classification variables of the object, Corporation A, through a color.

Face image 118 and object image 120 may be divided, such as into a grid pattern, where each bounded area presents an independent image. Each independent image may represent independent or related sets of data. Thus, object 100 itself may present data images having different degrees of relationship.

Object image 120 may present a color to represent a visual summary of the object variables. As shown in **Figure 1**, the hue of the color may give the appearance of a three dimensional presentation. The three dimensional presentation may appear to be on faces 102. Alternatively, the three dimensional presentation may appear to be removed from faces 102. For example, the three dimensional presentation may appear inside object 100 so that edges 104 appear remote from object image 120.

Object image 120 may be opaque. Alternatively, a luster may disposed on a color surface of object image 120. Adding glossiness to the color brightness of object image 120 may convey positive information through an increase in luster and negative information though a decrease in luster. Accordingly, any object image 120 luster may vary over a brightness range.

In one embodiment, object image 120 is translucent so that diffused images may be perceived behind object 100. Where object 100 does not represent any object variables, object 100 may be transparent so that clear images may be perceived behind object 100. Perceiving images behind object 100 is discussed in connection with object cluster 400 of **Figure 4**.

One or more of the object variables represented by object image 120 may change over time. For example, the stock return rate for Corporation A may change over time. To permit a viewer to perceive changes in the object variables, the hue of the color in object image 120 may transition over time. The transition of the color hue of object image 120 may represent a trend, such as an increase in the stock return rate for Corporation A.

The visual summary transition of object image 120 may be in real time to reflect a 1:1 correlation with the changing data. Real time may be viewed as a time continuum in which events occur in apparently irreversible succession from the past through the present to the future. The computer based data that represents real life events may be manipulated, such as by back playing cube 100 events for the past twenty-four hours. Moreover, since the computer based data that represents real life events may be reversed, events can be made to graphically occur in reversible succession from the future through the present to the past.

Intervals on the time continuum may be over a short duration such as seconds, minutes, or hours. Here, an embodiment of the invention may be employed in graphically representing the immediate present, such as real market movement events within Corporation A as those events are occurring. Such real market movements may be frozen in time and published each day in a newspaper, for example, as volume percentage change, closing price, and change of stock market.

Alternatively, time continuum intervals may be over a long duration such as days, weeks, months, years, decades, or even astronomical or geological time. To view object variable changes over long a duration, the visual summary transition may be a mathematical operation of real time, such as a fraction or exponential of real time, to reflect a mathematical correlation with the changing data that is other than a 1:1 correlation. Employing a mathematical operation of real time may permit an actual replay of events at an accelerated, variable, or reduced speed.

A user may control the replay speed to capture detailed relationships of the variables. For example, if the variables change too slowly to perceive relationships, then the user may replay the data at an accelerated speed to see a correlation of activity. If the variables change too quickly to perceive relationships, then the user may need to slow the data replay down to perceive details so as to understand the relationship of the variables depicted.

Reflecting a mathematical correlation with the changing data that is other than a 1:1 correlation may permit a graphical representation of events where it is impracticable to represent a 1:1 correlation between the graphical image change and the event change. In this way, an embodiment of the invention may be employed in analyzing past and future events in addition to those that occur in the immediate present. As an example, on October 1, 1999, a user of cube 100 may back playing cube 100 events for the past twenty-four hours, where those twenty-four hours occurred on October 1, 1998.

Representing events and changes in events through object 100 may include representation by one or more devices perceivable by the human senses, whether those events are real life events or otherwise. For example, the sense perceivable devices may include at least one of touch, taste, sight, sound, and smell. Object 100 may employ or be employed by these sense perceivable devices to pattern data change in a variety of ways. As an example, through color codes blinking signals and an audible sound, object 100 may indicate real market movement within Corporation X as it is occurring. For example, object 100 may also appear to vibrate for a an accelerated growth rate of a bacteria or appear to darken for diminished phone traffic as monitored by a government agency.

Pictures may be associated with preestablished rate or value thresholds in the data. For example, face image 118 may display dollars stacking up upon themselves for a fast rising stock. Face image 118 may display a skull and cross bones for stock whose value drops below U.S.$1.00. The pictures may be static or moving pictures.

In one embodiment of the invention, object 100 may represent changes in a variable through light flashes within the diffused color of object 100, much like the glow of lightening within a cloud. Object 100 may represent the lack of change in any variables by not presenting a signal within the diffused color of object 100.

Each variable of object image 120 may have its own change indicating signal. For example, change in a group of risk factor variables that includes the corporation credit rating may be represented by flashing, capitalization change may be represented by color change, and industry sector change, even though unlikely, may be represented by beeping.

Object 100 may be moved, such as by being rotated or stretched. This may present different faces to a user. Alternatively, a user may move around object 100 while object 100 remains relatively fixed. Moreover, a user may move in and then within object 100.

Object 100 may be divided by a user to obtain a portion of object 100. For example, Object 100 may be divided by cutting a piece from object 100, slicing between the surfaces of object 100 through an axis of object 100. The newly formed portions may be move or otherwise manipulated similar to object 100.

II. Object Universe

As noted above, object 100 may represent an object, such as Corporation A. In turn, Corporation A may be characterized by one or more variables. These variables may include the name of Corporation A, its credit rating, its capitalization, and its industry sector. The collective of object variables may define the universe of object variables.

In addition to serving as a graphical user 'display' device, object 100 may also serve as a graphical user 'interface' device. A graphical user interface device may be software programs that present a visual, graphical interface to a computer user so as to permit the user to interact with stored items and objects through a database manager software of a computer operating system. Various selective visual display devices, such as buttons and pull down menus, and on-screen techniques, such as drag and drop between differentiated window workspaces or items, may be included as part of the graphical user interface device of the invention. The visual representation and query or input facilities may make-up a graphical user interface.

By sliding a computer mouse over a face 102 (such as face 106) of object 100, object 100 may light up to indicate that it is an active cube. In addition, information about the identification of object 100, the location of object 100, and the identification of face 106 may appear, such as through a pop-up balloon or within an information bar at the bottom of the computer monitor. In one embodiment, the information (cube ID, cube location, cube face ID) appears as

(CORPORATION A, 1-1-1, 1)

By selecting an active cube, a spreadsheet may appear. **Figure 2** illustrates spreadsheet 200 of the invention. Spreadsheet 200 may be a screen-oriented interactive program that enables a user to lay out data on the screen of a computer monitor. As a type of non-algorithmic application program, spreadsheet 200 may manipulate numerical and string data in rows and columns of cells. The value in a cell, such as cell 202 may be calculated from a formula that can involve other cells, such as cell 204 and cell 206. A value may be recalculated automatically whenever a value on which it depends changes. Different cells of spreadsheet 200 may be displayed with different formats. Moreover, spreadsheet 200 may support three-dimensional matrices and cyclic references that lead to iterative calculation. Spreadsheet 200 may be based on spreadsheet products from at least one of Microsoft Corporation, Redmond, Washington, Lotus

Development Corporation, of Cambridge, Massachusetts, and Inprise (Borland) Corporation, Scotts Valley, California.

When object 100 or a face of object 100 is opened to present a spreadsheet, the spreadsheet may show: A) a first set of variables categorized by a user at the creation of object 100 B) a second set of variables, and C) a priority of impact based on changes.

The spreadsheet that appears subsequent to selection may be a function of where on cube 100 the selected is made. For example, if face 106 of **Figure 1** is selected, a spreadsheet related to the credit rating of Corporation A may appear. If face 122 is selected, a spreadsheet related to the industry sector of Corporation A may appear. If face 124 is selected, a spreadsheet related to the capitalization of Corporation A may appear. If edge 108 is selected, a spreadsheet related to the credit rating and to the capitalization of Corporation A may appear since face 106 and face 124 have edge 108 in common. Selecting corner 126 may bring up all of the spreadsheets related to face 106, 122, and 124 of cube 100.

B. Compiling selected variable data

Figure 3 represents method 300 of the invention. In general, method 300 may include retrieving data from a variety of sources at step 302, storing the data in a warehouse of data in a format that may be used by object 100 of the invention at step 332, and then transmitting selected warehouse data to object 100 of the invention at step 340.

At step 302, a user may initiate data retrieval. A number of data retrieval software packages exist. Examples include U.S. 3,014,671, entitled "Interactive Retrieval and Caching of Multi-dimensional Data Using View Elements" and U.S. 5,966,717, entitled "Methods for Importing Data Between Database Management Programs." Where these packages do not include the required interfaces, types of industry, types of data, location of the data, and evolution of technological interfaces features required by object 100, these packages may be modified to do so.

At step 304, a computer user may establish a data selection criteria. This data selection criteria may be based on those variables of object 100 that the user desires to monitor over time. Moreover, the data selection criteria may be based on a users definition of a universe of information which the user chooses to observe. This universe may exist based on any groups of large data, highly dynamic data or quickly changing data.

An example may be helpful. Assume that a mutual fund manager desires to compile over time, data that reflects the credit rating, capitalization, and industry sector variables of Corporation A. Other variables may be profit-to-earning ratio (P/E), earnings per share (EPS), and management. An insurance company or a government entity may employ different variables. In general, each industry that employs object 100 may have its own data selection criteria for each industry in which your invention may be used. In the product development area, for example, the selection variables may be quality of functions and generations of that product. The selection variables may also be components of functionality, existing industries where it currently exist and a time variable. A user may define any measurable criteria with changing points of information. Moreover, a user may define a universe within which their selection should be observed. This may permit the user to validate or refine their decision making process.

With the data selection criteria established at step 304, the user may then identify the sources from where the desired data may be selected at step 306. These sources may be databases that are accessible to the user over a network, such as the Internet, or accessible to the user within the user's own computer. In general, these sources may be any source that contains accessible information which can be quantified. For example, these sources may be with the following list: remote databases, shared databases, internal databases, real time data, customer resource management, meta data, supply chain support systems, meta data banks, portals, telecommunications, commerce chain management data sources and data marts. This list represents a dynamically changing field such that the list is only a sampling of sources by way of example and not by way of limitation.

It may be important that these data sources be reliable sources or even accessible to the user. In selecting the source or sources, a user may migrate between the most consistent reliable sources of data, since the most consistent reliable sources of data may change as each data source continue to evolve. Thus, the user may pick and choose at step 308 from among the step 306 identified sources those data sources from which to retrieve the data based on the step 304 established criteria. Steps 304, 306, and 308 may be performed in any order.

With the sources selected and the data selection criteria established, method 300 may proceed to step 310. At step 310, method 300 may compare data in the sources selected to the data selection criteria. If there is a match at step 312, data may be retrieved at step 314. From step 314, method 300 may proceed to step 316. If there is not a match at step 312, method 300 may proceed to step 316 from step 312.

At step 316, method 300 may determine whether the end of the data sources has been reached. If the end of the data sources has not been reached, method 300 may return to step 310 and continue to compare data in the sources selected to the data selection criteria. If the end of the data sources has been reached, method 300 may proceed to step 318 and to step 322.

It may be important for there to be an ongoing feed of the most up-to-date data information to an object 100 of the invention. Thus, at step 318, method 300 may determine whether data in the sources selected has been changed. Data in the sources selected may have been changed where data is added to, removed from, or altered in the sources selected. If data has been changed, method 300 may return to step 310 and continue to compare data in the sources selected to the data selection criteria. If data has not been changed, method 300 may proceed to step 320 from step 318. At step 320, method 300 may check to see if data has been changed by returning to step 318.

At step 322, method 300 may filter the data retrieved at step 314 by rejecting some data and passing others. Criteria to filter data at step 322 may be preestablished by the user. Factors of this criteria may be based on the individual choices of the user as determined by a unique or standard decision making process. The flexibility of method 300 works to permit the defining of a universe and the further defining of the criteria through which to filter that data.

From step 322, method 300 may proceed to step 330. At step 330, filtered data may be transmitted to a data warehouse. As noted above, a data warehouse may serve as a data storage and trading center. Transmission at step 330 may be by at least one of wireless transmission and transmission through a wire (for example, telephone or cable).

When the filtered data is received by the data warehouse, this data then may be assimilated into the datamart or data warehouse at step 332. Assimilation of data into the data warehouse may be based on preestablished selection criteria. Where data in the sources selected has been changed or where the established selection criteria has been changed, additional data may be assimilated into the data warehouse at step 332. This assimilation may including adding to or replacing existing data in the data warehouse.

Method 300 may then proceed to step 340. At step 340, warehoused data may be transmitted to an object of the invention, such as object 100 of **Figure 1.** At step 342, the data received object 100 may be converted to a graphical representation that may be perceived by at least one of the senses of the user.

The established selection criteria may be changed over the lifetime of object 100 of the invention. Thus, at step 350, method 300 may return to step 302 from step 342 where another cycle of method 300 may begin.

III. Object Clusters

A. Apparatus

By itself, object 100 may provide the ability to observe both the static and dynamic changes of events related to that object. Additionally, a plurality of objects 100 may be brought together into a cluster to provide the ability to observe both the static and dynamic changes of events related to each object, to a group of objects within the cluster, or even to the entire cluster itself.

A universe may be thought of as a grouping of specific knowledge sets created to deliver an even more unique set of data. Complex knowledge may represent an awareness of, being a part of a universe, specific functions within that universe, functions of the universe, and boundaries of the universe. An object cluster may be one technique of representing a universe. Here, an object cluster may have an awareness of what it is, an awareness of what it is not, and may present paradigms. Objects of the cluster may continually be in a state of change. If an object does not change, the object may be perfectly centered within its environment or the object may be outside of its environment (for example, not associated at all).

Figure 4 illustrates object cluster 400 of the invention. An object cluster may be viewed as one or more groups of similar objects gathered closely together so as to appear in a collective. For example, object cluster 400 may include a plurality of corporations as objects 402 operating in a common market, such as the New York Stock Exchange. Between forming an object and an object cluster, an object group may be formed and moved about the group.

In general, each object 402 may be arranged in a location that may be defined through a coordinate system by at least two coordinates with respect to a relatively fixed reference. The coordinate system employed may have as many coordinates as their are dimensions in the cluster space.

Examples of coordinate systems include Cartesian coordinates and polar coordinates.

Each object 402 may be arranged at a particular X, Y, and Z location. For example, the coordinates of cube 404 of **Figure 4** may be (6, 1, 4). The coordinates of cube 406 may be (3, 1, 2). Each object 402 having the same X, Y, and Z coordinate may appear in the same space but may be visually perceived differently to show an increase in change activity at that coordinate by being, for example, darker.

The field label of the X-axis, Y-axis, and Z-axis may be a function of the area in which the invention is employed. For example, in managing a bacteria culture growth, the fields of X-axis, Y-axis, and Z-axis may be time, sample, and subclassification, respectively. In the example of **Figure 4**, each object 402 may be arranged by the fields of credit rating (X), capitalization (Y), and industry sector (Z) to reflect investment risk level, corporate debt level, and business activity, respectively.

A credit rating (X) may be viewed as a public evaluation of the financial status of a corporation. As a published ranking, a corporation's credit rating may be based on detailed financial analysis by a credit bureau of a corporation's financial history, specifically as it relates to the corporation's ability to meet debt obligations. The highest credit rating is usually AAA, and the lowest is usually D.

Capitalization (Y) may be viewed as the total amount of long-term financing used by a corporation, including common stock, preferred stock, retained earnings, and long-term debt. On one hand, debt equates with a corporate obligation to repay an amount. On the other hand, this financing equates with money in which the corporation may use wisely to grow the business.

An industry sector (Z) may be viewed as a distinct subset of a market that includes corporations having a business activity with shared characteristics. Generally, the market is divided into industries and sectors with industries being a subset of a specialized sector. For example, bio-technology and pharmaceuticals are industries within the Healthcare sector. Other sectors include Basic Materials, Capital Goods, Conglomerates, Consumer Cyclical, Consumer/Non-Cyclical, Energy, Financial, Healthcare, Services, Technology, Transportation, and Utilities. Other examples of industries include the Advertising industry, the Coal industry, the Footwear industry, the Photography industry, the Railroads industry, and the Trucking industry.

Those variables that are presented as the field labels may be viewed as field or primary variables. Other variables not selected to be presented as the field labels, such as profit-to-earning ratio (P/E), earnings per share (EPS), and management, may be viewed as non-field or secondary variables.

One, some, or all of the universe of variables that comprise an object may be selected to cause objects 402 to signal the user, such as by changing color. The variables that cause objects 402 to signal the user may be viewed as indicating variables. Although some of the presented examples include three indicating variables, the number of indicating variables may be greater or less than three. Where the field variables are selected to cause object 402 to signal the user, the field variables may be viewed as indicating field variables.

Object cluster 400 may be sorted or arranged by a user based on how that user desires to analyze the conveyed information. For example, mutual fund managers may analyze the stocks of object cluster 400 from the top, down or from the bottom, up, either by selecting a corporation stock and observing its performance with respect to an industry or selecting an industry and observing the industry performance with respect to a particular corporation stock.

As noted above, the color of an object image, such as the object images for each objects 402, may reflect something about the data for the variables of each object. For example, the object image color of objects 408, 410, 412, and 414 may reflect the existence of data that is not changing over time. The object image color of object 416 may reflect a positive change of its data over time. The object image color of object 418 may reflect a negative change of its data over time. Similar object image colors within object cluster 400 may reflect similar changes. Since diffused images may be perceived behind an object 402, similar object image colors within object cluster 400 may be viewed.

The transparent object image color of object 420 may indicate that no data exists for the variables of object 420. Here, clear images may be perceived behind object 420. For example, object 406 may be perceived through object 420.

It is not necessary that each of the coordinate positions be filled by an object 402. For example, the coordinate position (6, 2, 4) in **Figure 4** does not include an object 402. In this way, the overall shape of object cluster 400 may convey information to the user of object cluster 400.

Conveying information through omission of objects from coordinate positions within an object clusters may be better understood through examples. Assume object cluster 400 represents a defined volume of space for which an air traffic control tower is responsible. Each object 402 within that volume of space may represent one aircraft. The omission of a pattern of airplane/object 402 from adjacent coordinate positions within object cluster 400 may convey a safe area in which to direct an airplane/object 402. Of course, the air traffic controller and each pilot may assign variables of that pilot's plane/object 402 to be monitored by the invention.

As another example, assume object cluster 400 represents coordinate space on and within an injured human body, where that coordinate space may contain human blood. Each object 402 within that coordinate space may represent one platelet within that person's blood. As each platelet/object 402 is circulated by the heart through the vertebrate vascular system, a doctor may monitor blood clotting efficiency by observing areas in which the platelets should be traveling but do not travel. The doctor may assign variables of each platelet/object 402 to be monitored by the invention.

Each object 402 may be moved, such as by rotating, separating from the remaining objects 402, stretching, or divided into portions. Moreover, object cluster 400 may be moved, such as by rotating. Alternatively, a user may move about object cluster 400 and within object cluster 400 as object cluster 400 remains relatively fixed.

B. **Attributes**

For object cluster 400, there may be a property feature that allows customization of appearance. These attributes may be preestablished by the user or changed by the user at any time. Standard schemes may come with software of the invention and additional schemes and features may be added, such as through updates.

(i) **Marble**

Object cluster 400 may present a general appearance of antique marbles slab surfaces. For example, objects 402 may range from solid marble patterns to intricate marble with bright veins of custom color running through them. The marble patterns may range from sparse veins of thin color to complex natural marble designs. Such marble patterns may be pre-designed and may be selected by a user from a menu of existing marble patterns.

Events of object cluster 400 may include negative or positive movement of primary variables, negative or positive movement secondary variables, splicing, rotating object cluster 400, empty cells, and populated cells. Splicing may be thought of as joining objects 402 by interweaving or overlapping and binding so as to form new combinations or alter an existing structure.

Object cluster 400 may have animation and sound properties and be accessible by tools such as mouse, cluster corner, and a control center. Animation properties may include lightening, blinking, and shadowing while sounds may include clicking blocks of marble (low pitch), clicking blocks of marble (high pitch), falling pieces of marble, rolling ball of marble, and blocks of marble sliding against each other.

Object cluster 400 presenting a general appearance of antique marbles slab surfaces may be summarized as follows:

Antique Marbles Slab Surfaces			
Event	**Color**	**Sound**	**Object Animation**
Negative Movement	Pre-selected	Clicking blocks of marble (low pitch)	Darkened
Positive Movement	Pre-selected	Clicking blocks of marble (high pitch)	lightened
Splicing		Blocks of marble sliding against each other	Vertical and/or horizontal Splitting of objects
Rotating the cluster		Rolling ball of marble	The cluster of objects rotates
Opening object			

(ii) Plastics

General Appearance: Bright, glossy deeply colored objects shapes. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Colors: A spectrum of deep solid colors. Pattern: none. Animation properties: Lightening; Blinking; and shadowing. Sounds: Hard Plastic hollow objects clicking together (high); Hard Plastic hollow objects clicking together (low); Rolling playing blocks; and Plastic container opening sound. Tools: Mouse; Cluster Corner; and Control Center.

Plastics			
Event	**Color**	**Sound**	**Object Animation**
Negative Movement	Pre-selected	Hard Plastic hollow objects clicking together (low)	Darkened
Positive Movement	Pre-selected	Hard Plastic hollow objects clicking together (high)	Lightened
Splicing			
Rotating the cluster			

(iii) Metal

General Appearance: Elegant metal shapes giving the dimensional and appearance of weight and value. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Color: Silver; Gold; Platinum; Copper; and bronze. Pattern: Solid and highly glossed as polished metal. Animation properties: Lightening; blinking, and shadowing. Sounds: Heavy blocks of solid metal objects clicking together (high); Heavy blocks of solid metal objects clicking together (low); Coins; and Metal Urn (type). Tools: Mouse; Cluster Corner; and Control Center

(iv) **Heavy Metal**

General Appearance: Bright metallic shapes giving the appearance of being electrically charged. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Color: Electric Blue; Electric Green; Electric Pink; Blue/Black; Platinum; Electric Orange; and Electric Purple. Pattern: Solid and highly glossy as polished metal. Animation properties: Lightening; blinking; and shadowing. Sounds: Electric guitar cords (heavy); Electric guitar cords (light); Heavy blocks of solid metal objects clicking together (high); Heavy blocks of solid metal objects clicking together (low); Drum phrase #1; Drum phrase #2; Electric guitar phrase #1; and Electric guitar phrase #2. Tools: Mouse; Cluster Corner; and Control Center.

(v) Wood

General Appearance: Polished glossy wood blocks ranging from finely grained to course grains and various natural wooded patterns. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Colors: Pine; Oak; Cedar; and Cherry wood. Patterns: Consistent with natural wood patterns. Animation Properties: Lightening; blinking; and shadowing. Sounds: Heavy blocks of solid wood objects clicking together (high); Heavy blocks of solid wood objects clicking together (low); Wooded objects clicking together; and Wooded panel opening with stressed wood sounds. Tools: Mouse; Cluster Corner; and Control Center

(vi) Rubber

General Appearance: The appearance of bong-bong rubber objects that suggest they could bounce around at any time. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Colors: Standard shades with the appearance of a rubber dust cover as the cover of rubber balls. Patterns: Rubber ball patterns (dimples). Animation Properties: Lightening; Blinking; and shadowing. Sounds: Bouncing object (high); Bouncing object (low); Dribble rapid bounce; Rubber band popping; Bouncy vibration (high); Bouncy vibration (low). Tools: Mouse, Cluster Corner, and Control Center.

(vii) Clear Gels skins with data visible from the outside

General Appearance: Clear objects with the appearance of being filled with colored transparent liquid. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Colors: Color spectrum with transparent shades. Patterns: No external patterns. The key indicator data may be visible from outside the cell. Animation Properties: Lightening; Blinking; and shadowing. Sounds: Under water bubble (high); Under water bubble (low); Muffled underwater vibration tones. Tools: Mouse; Cluster Corner; and Control Center.

(viii) Clouds

General Appearance: The objects will have cloud patterns and appear slightly puffier. Events: Negative movement primary variables; Positive movement primary variables; Negative movement secondary variables; Positive movement secondary variables; Splicing; Rotating the cluster; Empty cells; and Populated cells. Colors: A complete color wheel of soft pastel colors with swirling cloud patterns. Patterns: Swirling cloud patterns. Animation Properties: Lightening; Blinking; and shadowing. Sounds: wind; birds; harps; and breeze. Tools: Mouse; Cluster Corner; and Control Center

C. Method

Figure 5 illustrates method 500 of the invention. At step 502, each object 402 of object cluster 400 may gather data to supply the selected variables of each object 402. Here, each object 402 may employ method 300 to perform step 502 automatically and continuously. For example, once an initial step 310 of **Figure 3** is reached, no further user input is needed to supply the selected variables of an object 402 with data.

With the data supplied to the selected variables of each object 402, method 500 may proceed to step 504. At step 504, method 500 may establish object cluster 400 by at least one of automatically and manually incorporating each object 402 into object cluster 400. To establish object cluster 400, method 500 may proceed to step 506.

At step 506, method 500 may compare at least one variable of each object 402 against variables in the remaining objects 402 in object cluster 400. For example, each object 402 may compare its coordinate fields (for example, the X, Y, and Z fields) against each other object 402 in object cluster 400.

At step 508, method 500 may incorporate each object 402 of object cluster 400 into object cluster 400 at a particular coordinate.

Through the comparisons at step 506, each object 402 of object cluster 400 may incorporate itself into object cluster 400 at a particular coordinate. Alternative to an object 402 incorporating itself into object cluster 400 at a particular coordinate, at least one object 402 may be manually fixed at a predetermined coordinate by the user so that the remaining objects 402 may incorporate themselves into object cluster 400 about those fixed objects 402.

As step 510, method 500 may determine whether each object 402 is incorporated into a particular coordinate. If each object 402 is not incorporated into a particular coordinate, method 500 may return to step 508. If each object 402 is incorporated into a particular coordinate, method 500 may conclude at step 512 that an initial object cluster 400 is established.

A surprising feature of the invention is that the data information compiled for an object 402 may know what it is in the context of a larger universe of information, here object cluster 400, and thus may be viewed as being aware of itself through comparison. Importantly, by continuing an automatic object comparisons over time, each object 402 may rearrange itself to different coordinates based on the outcome of a coordinate field comparison. Thus, if each object 402 is incorporated into a particular coordinate at step 510, method 500 may return at step 514 to step 502 where additional or different variable data may be gathered for each object 402, such as through method 300 of **Figure 3**.

An advantage of method 500 is that information is made liquid; that is, information may be moved around within a sea of information so as to provide different presentations of both static information and dynamic change of that information.

In the stock market example provide, if a particular stock is moving within an industry, this change in data may be displayed in an object 402 in the context of the other selected industry stocks. Knowing which indicating variables were selected for a particular industry in view of the visual image of a particular stock moving within an industry in the context of the other selected industry stocks may convey a trend in the market.

The methods of the invention may be implemented through a readable storage medium containing executable computer program instructions which, when executed, cause a computer system to perform a multidimensional database analysis tool method. The readable storage medium may be a distributed readable storage or a computer readable storage medium.

IV. Three Dimensional Cluster Apparatuses In General

As noted above, object 100 may present a cube. In general, object 100 may be present a three dimensional shape as bounded by at least one face, where each face may be a closed figure. More particularly, each face may be a closed plane figure bounded by three or more edge segments.

Figure 6A illustrates object cluster 602, where each object 604 in object cluster 602 is a sphere such that each point on face 606 of each object 604 is equidistant from a center point. Here, object 604 includes one relational face. Alternatively, some points on face 606 may be at a different distance from a center point to present face 606 as including smooth contours or distortions. Although not illustrated, each object 602 of object cluster 602 may be present the shape of a spheroid generated by rotating an ellipse about its longer axis, as in the prolate shape of a cigar. Moreover, one or more objects 602 of object cluster 602 may present a solid shape that is different than the remaining objects 602.

Figure 6B illustrates object cluster 608, where each object 610 in object cluster 608 is dihedral.

Object 100 of **Figure 1** may be a geometric figure having a specified kind or polyhedron number of surfaces. **Figure 6C** shows object cluster 612, where each object 614 in object cluster 612 is a decahedron. Since each face may reveal at least one different spreadsheet, each decahedron object 612 may permit instant access to ten spreadsheets.

V. <u>Conclusion</u>

The invention may permit a user to see patterns in large quantities of data that may not otherwise be perceptible.

The exemplary embodiments described herein are provided merely to illustrate the principles of the invention and should not be construed as limiting the scope of the subject matter of the terms of the claimed invention. For example, Humans process information in a variety of ways. For example, on seeing an image, a user may then think about what was seen which, in turn, may generate human feelings from those seen images. By employing knowledge and cognitive system techniques, object and object cluster shapes and images presented by each of the same may be developed to better coordinate the message sent with the message received. The principles of the invention may be applied toward a wide range of systems to achieve the advantages described herein and to achieve other advantages or to satisfy other objectives, as well.

CLAIMS

What is claimed is:

1. A multidimensional database analysis tool method, comprising:

(i) gathering data for a plurality of objects, each object having at least three variables and an object image, wherein each object image is based on one of the at least three variables;

(ii) supplying the data to the at least three variables of each object;

(iii) associating the at least three variables of each object as individual members of a coordinate number set;

(iv) comparing the coordinate number set of each object with the coordinate number set of each remaining object, wherein the comparison results in an outcome; and

(v) incorporating at least one object into a three dimensional object cluster at a particular coordinate within the object cluster based on the outcome of comparing the coordinate number set of each object with the coordinate number set of each remaining object.

2. The method of claim 1, further comprising:

displaying each object image over the passage of time.

3. The method of claim 1, wherein associating at least three variables of each object as individual members of a coordinate number set includes associating at least three variables of each object as individual members of an X, Y, and Z coordinate number set.

4. The method of claim 3, wherein comparing the coordinate number set of each object with the coordinate number set of each remaining object includes comparing the X coordinate of a first object with the X coordinate of the remaining objects.

5. The method of claim 1, wherein incorporating at least one object into the three dimensional object cluster includes automatically incorporating at least one object into the three dimensional object.

6. The method of claim 1, prior to comparing the coordinate number set of each object with the coordinate number set of each remaining object, the method further comprising:

manually fixing at least one object at a predetermined coordinate.

7. The method of claim 1, the method further comprising:

(vi) determining whether each object is incorporated into a particular coordinate; and

(vii) if each object is incorporated into a particular coordinate, returning to step (i).

8. A readable storage medium containing executable computer program instructions which, when executed, cause a computer system to perform a method comprising:

(i) gathering data for a plurality of objects, each object having at least three variables and an object image, wherein each object image is based on one of the at least three variables;

(ii) supplying the data to the at least three variables of each object;

(iii) associating the at least three variables of each object as individual members of a coordinate number set;

(iv) comparing the coordinate number set of each object with the coordinate number set of each remaining object, wherein the comparison results in an outcome; and

(v) incorporating at least one object into a three dimensional object cluster at a particular coordinate within the object cluster based on the outcome of comparing the coordinate number set of each object with the coordinate number set of each remaining object.

9. The storage medium of claim 8, further comprising: displaying each object image over the passage of time.

10. The storage medium of claim 8, wherein associating at least three variables of each object as individual members of a coordinate number set includes associating at least three variables of each object as individual members of an X, Y, and Z coordinate number set.

11. The storage medium of claim 10, wherein comparing the coordinate number set of each object with the coordinate number set of each remaining object includes comparing the X coordinate of a first object with the X coordinate of the remaining objects.

12. The storage medium of claim 8, wherein incorporating at least one object into the three dimensional object cluster includes automatically incorporating at least one object into the three dimensional object.

13. The storage medium of claim 8, prior to comparing the coordinate number set of each object with the coordinate number set of each remaining object, the method further comprising:

manually fixing at least one object at a predetermined coordinate.

14. The storage medium of claim 8, the method further comprising:

(vi) determining whether each object is incorporated into a particular coordinate; and

(vii) if each object is incorporated into a particular coordinate, returning to step (i).

15. A multidimensional database analysis tool, comprising:

a plurality of objects, each object having at least three variables and an object image,

wherein the at least three variables of each object include data,

wherein each object image is based on one of the at least three variables, wherein the at least three variables of each object are associated as individual members of a coordinate number set, and

wherein each object is incorporated into a three dimensional object cluster as a function of the coordinate number set of that object.

16. The tool of claim 15, wherein at least one object is a three dimensional graphical user device.

17. The tool of claim 15, wherein at least one variable is from at least one of the following industry sectors: Basic Materials, Capital Goods, Conglomerates, Consumer Cyclical, Consumer/Non-Cyclical, Energy, Financial, Healthcare, Services, Technology, Transportation, and Utilities.

18. The tool of claim 15, wherein each coordinate number set is an X, Y, and Z coordinate number set.

19. The tool of claim 15, wherein each object is a sphere.

20. The tool of claim 15, wherein each object is a dihedral.

FIG.1

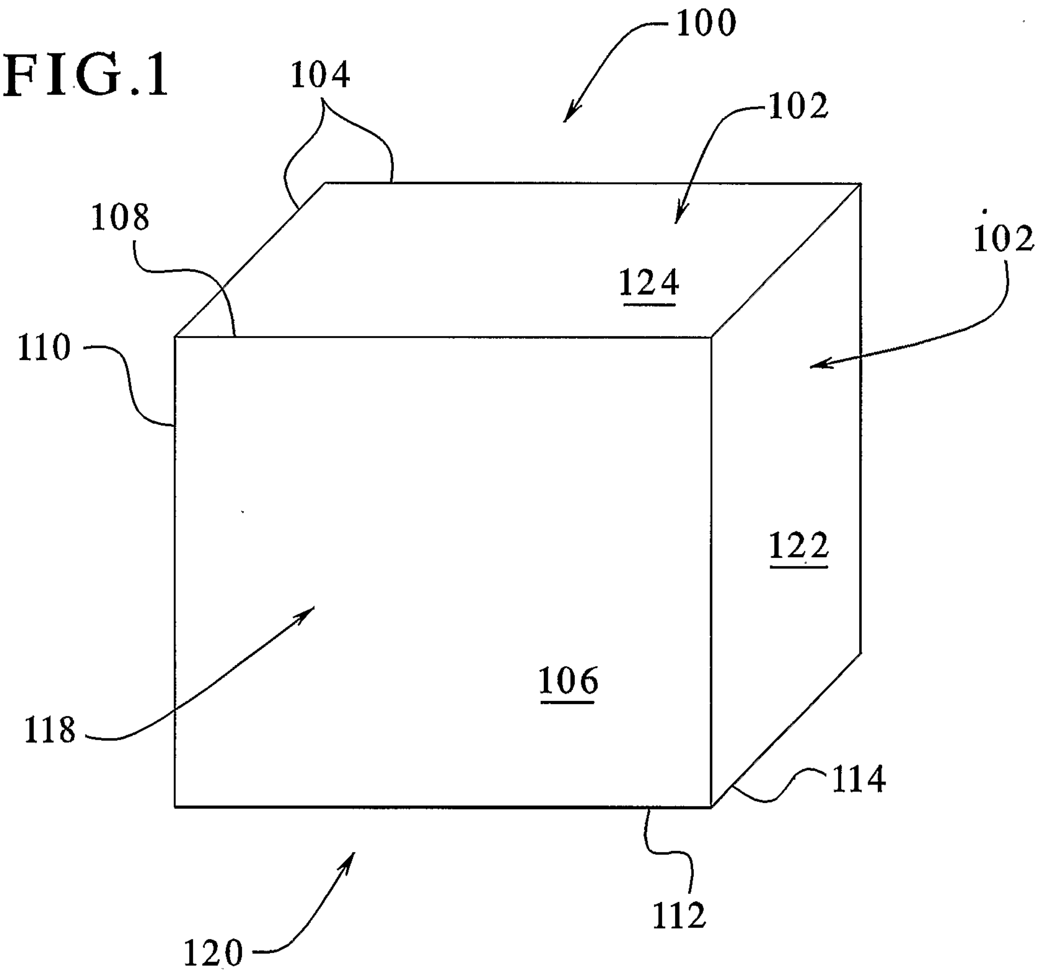


FIG.2

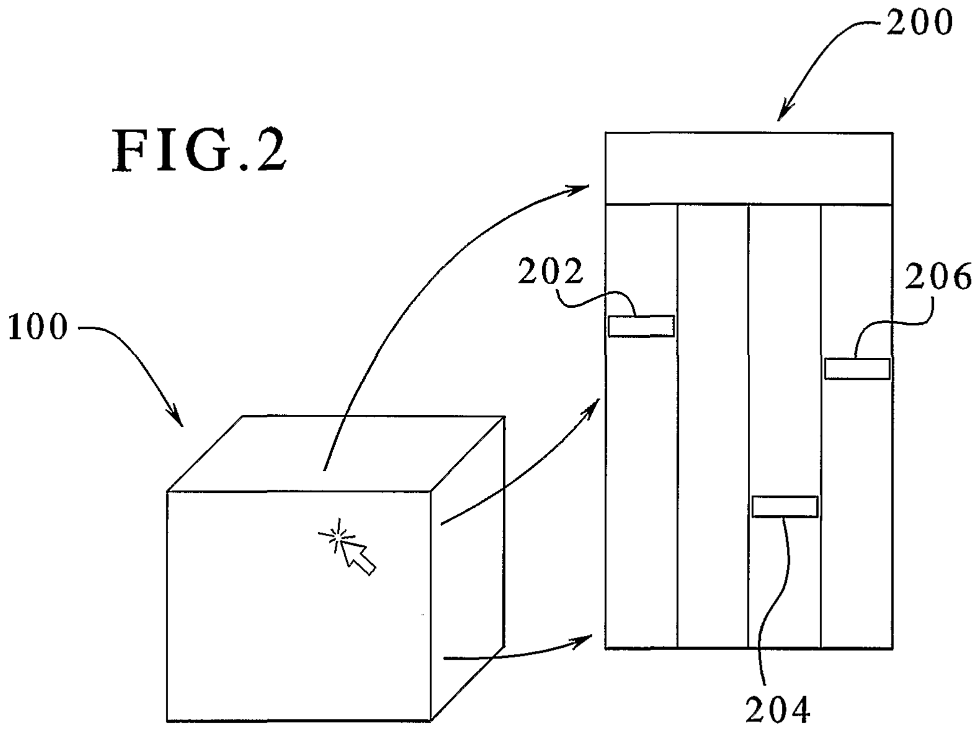
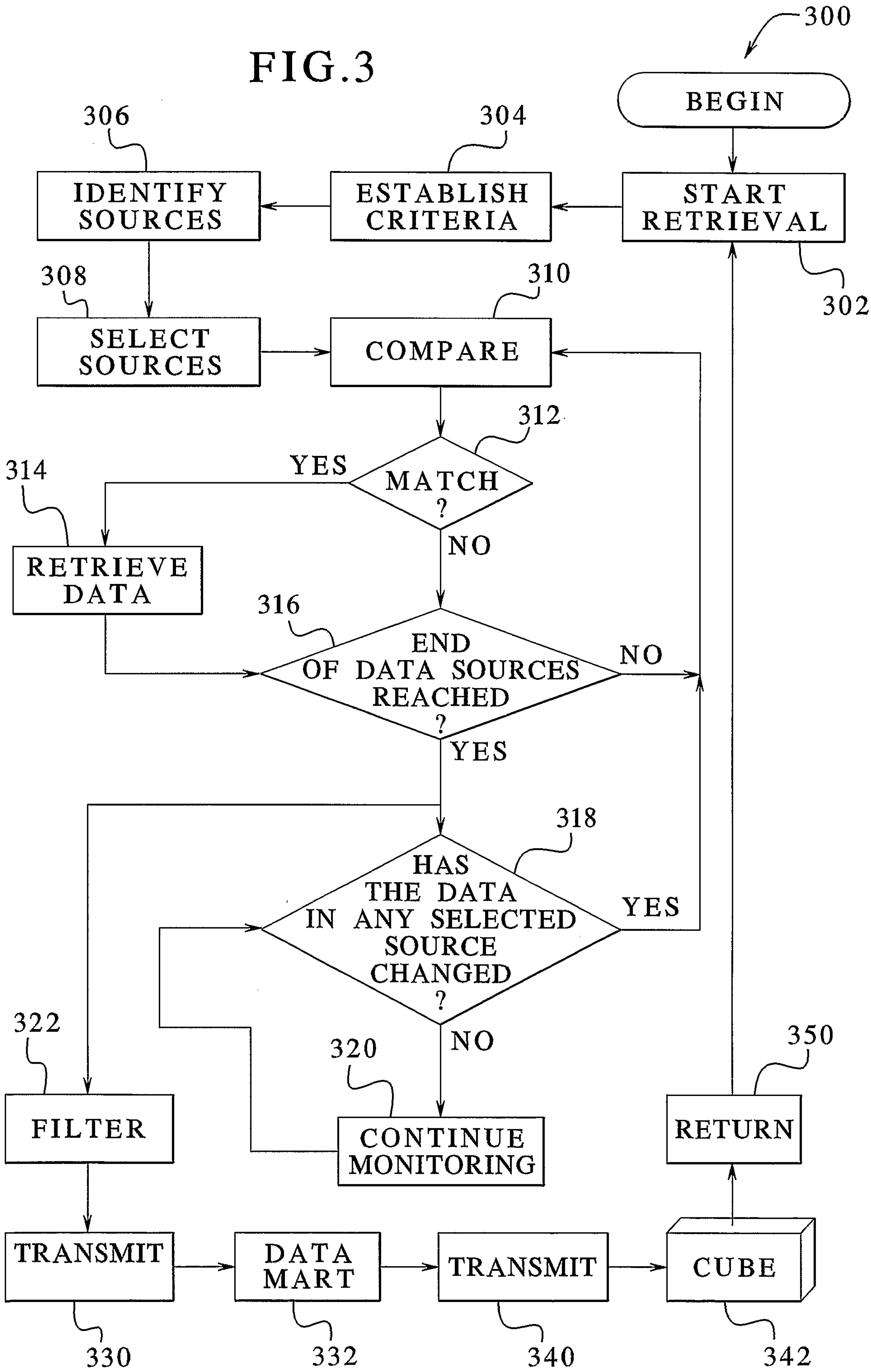
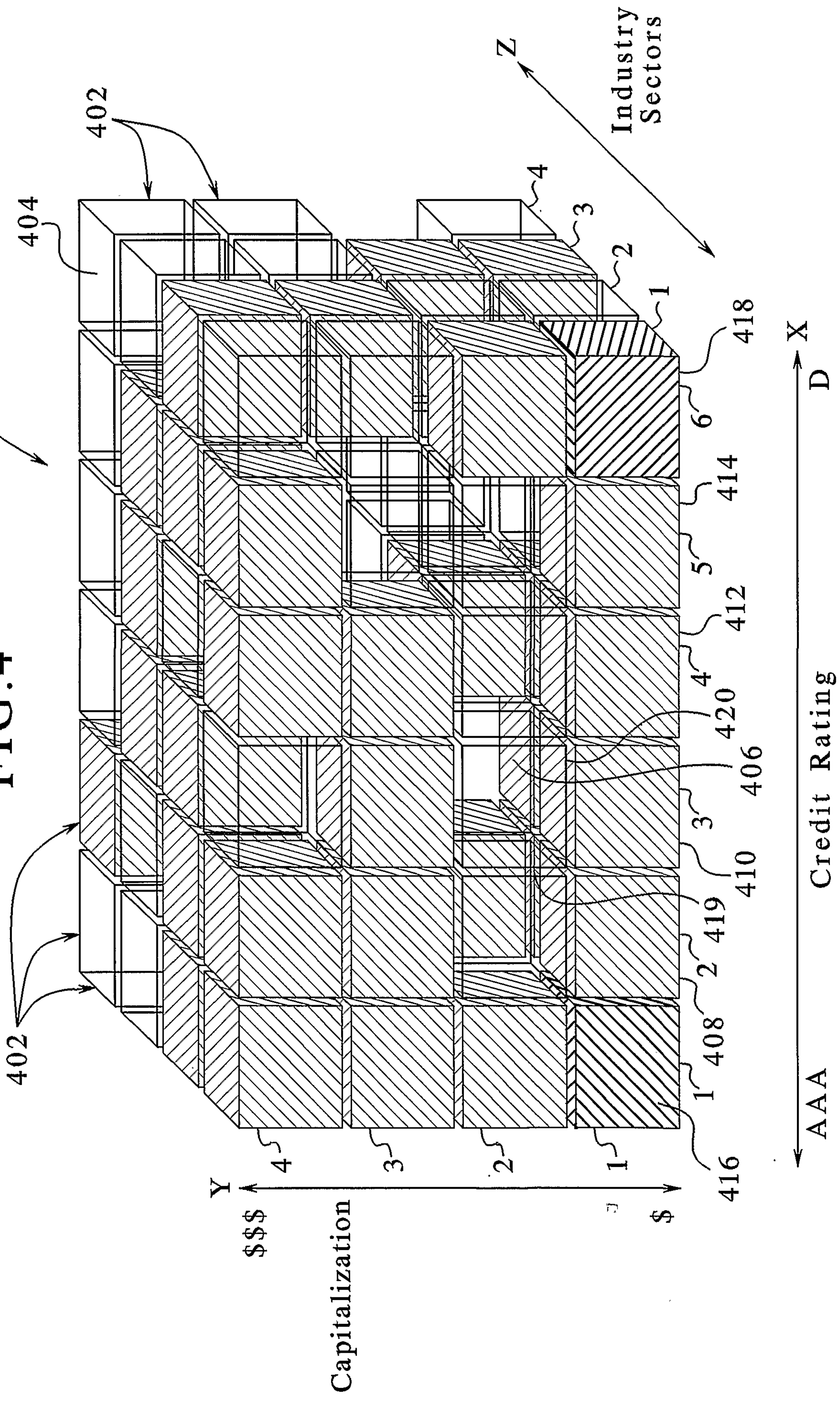


FIG.3


300
BEGIN
START RETRIEVAL
302
ESTABLISH CRITERIA
304
IDENTIFY SOURCES
306
SELECT SOURCES
308
COMPARE
310
MATCH ?
312
YES
NO
RETRIEVE DATA
314
END OF DATA SOURCES REACHED ?
316
NO
YES
HAS THE DATA IN ANY SELECTED SOURCE CHANGED ?
318
YES
NO
CONTINUE MONITORING
320
FILTER
322
TRANSMIT
330
DATA MART
332
TRANSMIT
340
CUBE
342
RETURN
350


400
402
404
Z
Industry
Sectors
X
D
Credit Rating
AAA
Y
$$$
Capitalization
$
406
408
410
412
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416
418
419
420

FIG.4

FIG.5

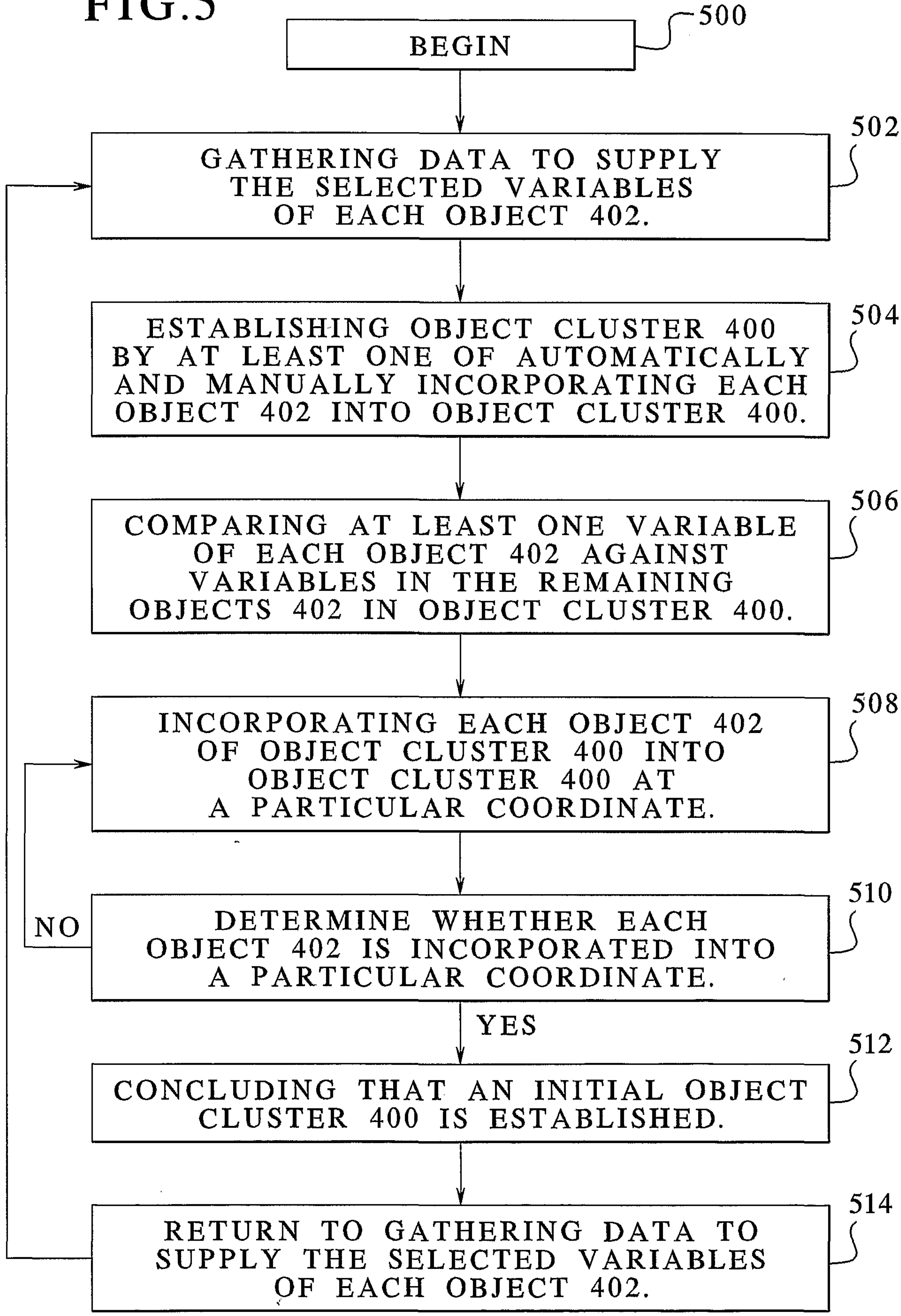
BEGIN
500
GATHERING DATA TO SUPPLY THE SELECTED VARIABLES OF EACH OBJECT 402.
502
ESTABLISHING OBJECT CLUSTER 400 BY AT LEAST ONE OF AUTOMATICALLY AND MANUALLY INCORPORATING EACH OBJECT 402 INTO OBJECT CLUSTER 400.
504
COMPARING AT LEAST ONE VARIABLE OF EACH OBJECT 402 AGAINST VARIABLES IN THE REMAINING OBJECTS 402 IN OBJECT CLUSTER 400.
506
INCORPORATING EACH OBJECT 402 OF OBJECT CLUSTER 400 INTO OBJECT CLUSTER 400 AT A PARTICULAR COORDINATE.
508
NO
DETERMINE WHETHER EACH OBJECT 402 IS INCORPORATED INTO A PARTICULAR COORDINATE.
510
YES
CONCLUDING THAT AN INITIAL OBJECT CLUSTER 400 IS ESTABLISHED.
512
RETURN TO GATHERING DATA TO SUPPLY THE SELECTED VARIABLES OF EACH OBJECT 402.
514

FIG.6A

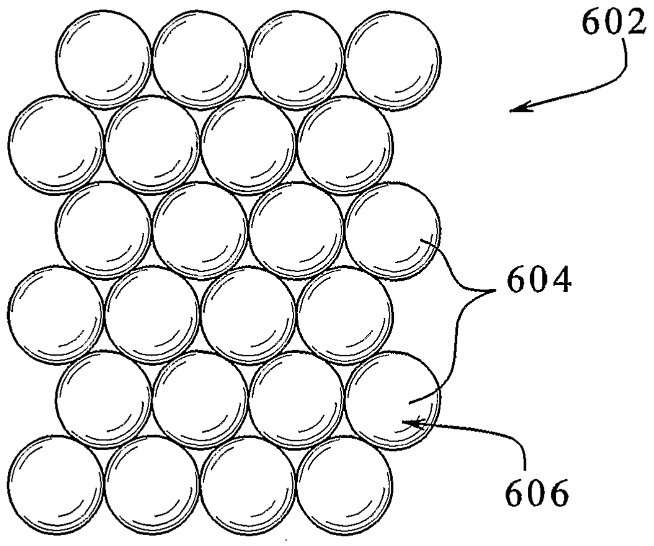

FIG.6B

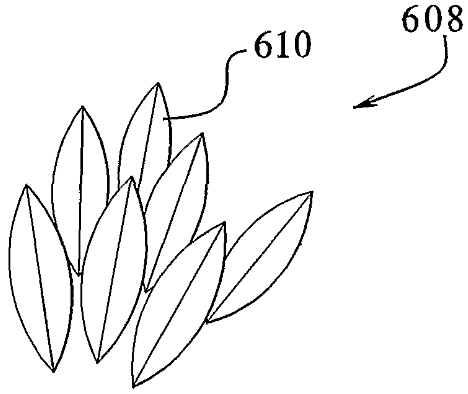

FIG.6C