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AN INTRODUCTION TO THE MEGA-DISKS NETWORKS MAPPING

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ABSTRACT This paper proposes a new multidimensional coordinate space that is called "The Mega-Disks Networks Mapping (MDN-Mapping)." The MDN-Mapping captures a large amount of information from n-dimensions in the same graphical space and time. Therefore, the MDN-Mapping creates the possibility to visualize a large number of endogenous and exogenous variables that are distributed and interconnected in different Nano-Disks (j), Micro-Disks (k), Sub-Disks (L), and General-Disks (m) without any visual restriction respectively. Now, it is possible to observe how infinity endogenous variables are moving together with infinity exogenous variables simultaneously in the same graphical space. At the same time, we can visualize how all these variables interact together through the visualization a large number of asymmetric spiral-shaped figures with n-faces that keeps changing always. This asymmetric spiral-shaped figures with n-faces can experience anytime an expansion or contraction that depend on different changes from any Nano-Disk (j) until arrive to the Mega-Disk (ξ) (or the mega-arithmetic mean).

(**Keywords**: Econographicology, Multi-Dimensional graphs and Multi-Dimensional Geometry)

INTRODUCTION

The Idea of Time and Space from A Multi-Dimensional Graphical Perspective

The idea of space and time from a multidimensional graphical perspective is complex and rather deep for the human mind to penetrate. This is because we need to often perform abstractions and parameterizations of any geometrical object or a large multi-variable behavior that cannot be visualized in the real world. Moreover, this part of this research paper proposes an alternative definition of multi-spaces. According to this paper, the term "multi-spaces" can be defined "as the unique mega-space that is built by infinite general-spaces, sub-spaces and micro-spaces that are systematically inter-connected." Therefore, the process of visualizing different multi-spaces made possible by the use of multi-dimensional coordinate spaces. These multi-dimensional coordinate spaces can generate the perfect graphical modeling framework to represent different dimension(s) in the same graphical space. In fact, the classic 2-Dimensional and 3-Dimensional Cartesian planes are available to generate an idea about dimension(s) graphically through the optical visualization of several lines in a logical order by length, width and height. The concept of multi-spaces can also be explained by Euclidian geometry under the uses of the Euclidian spaces. Euclidian geometry can be divided into 2-dimensional Euclidean geometry (plane geometry) and 3-dimensional Euclidean geometry (solid geometry). Additionally, the study of Euclidian geometry also involves the examination of the n-dimensional space represented by R^n or E^n under the uses of the n-dimensional space and n-vectors respectively.

With the availability of multi-spaces is based on the application of Cartesian Spaces (Ruiz Estrada, 2011). The Multi-Dimensional Cartesian spaces can generate multi-dimensional-spaces with different dimensions that can be shown to move with time. In this paper we are concerned with the application of multi-spaces in visualizing and modeling total change in an independent in response to changes in any or all of the (many) independent variables affecting it within the same framework of space and time. The multidimensional-spaces can also be used to describe dynamic and multifunctional analyses that represent changes within the total function of any variable. Finally, the next section discusses the application of the mega-disks networks mapping (MDN-Mapping).

The Mega-Disks Networks Mapping (MDN- Mapping)

Initially, the Mega-Disks Networks Mapping (MDN-Mapping) proposes a new graphical modeling to visualize a large amount of data in the same graphical space (Ruiz Estrada, 2011). Firstly, the Mega-Disks Networks Mapping (MDN-Mapping) shows five types of disks: (a.) Nano-Disks (j); (b.) Micro-Disks (k); (c.) Sub-Disks (L); (d.) General-Disks (m); (e.) Mega-Disk (ξ) (see Figure 1). The first type of disks in the Mega-Disks Networks Mapping (MDN-Mapping) is called the

Nano-Disks (Ruiz Estrada, 2014). The Nano-Disks (j) are represented graphically by a very small circle that keep one single vertical straight axis that is pending among all nano-endogenous variables ($\alpha i_{<R:\varsigma>}$). Each nano-endogenous variable keeps its specific sub-coordinate system that is based on two points of reference. First is the origin position line (R) that is distributed in a perimeter of 360° degrees or 2π at the Nano-Disk (j). Hence, each degree (or angle) represents the origin position line of each nano-endogenous variable in the same Nano-Disk (j). We always need to plot the first nano-endogenous variable at the origin position line zero (R_0) in the degree 0° then we need to plot the next nano-endogenous variable in the next degree level. Accordingly, it is depend on the number of nano-endogenous variables in analysis in the same Nano-Disk (j) (see Expression 2). On the other hand, the second point of reference in the sub-coordinate system in the Nano-Disk (j) is the disk level "ς" that is the number of disk inside of the Nano-Disk (j). In our case, "ς" always is represented by a positive real number between 0 to ∞…This imply that exist "∞" number of small disks within the Nano-Disk (j). In fact, we are able to plotting each nano-endogenous variable according to expression 1 on the top of the platform of each Nano-Disk (j) respectively.

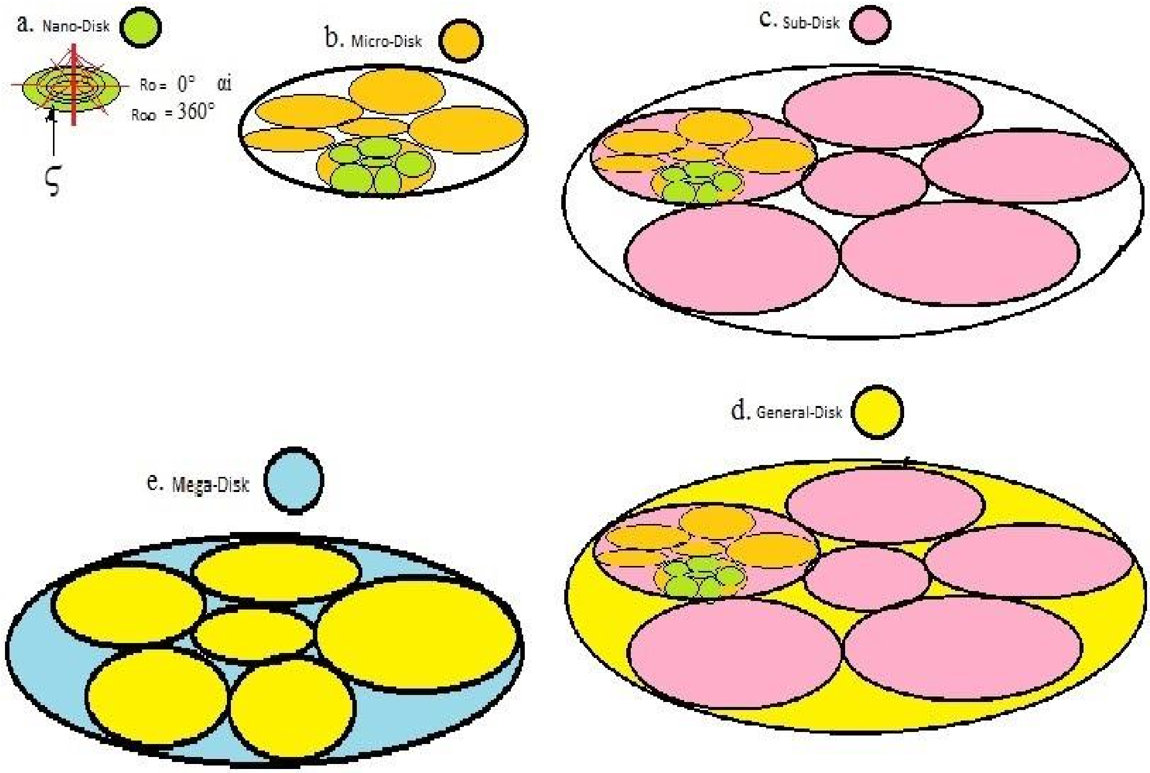


Figure 1. The Mega-Disks Networks Mapping (MDN-Mapping) by Parts
Source : Author

$$(\boldsymbol{\alpha_i}\mathbf{<R:\varsigma>}) \quad \textbf{(1)}$$

In the case of the origin position line (R) is necessary first to calculate the origin position line distance rate (ΔR).

$$\mathbf{\Delta R = 360^{\circ}/n} \quad \textbf{(2)}$$

Where "n" represents the number of nano-endogenous variables in analysis in this specific Nano-Disk (j). Therefore, the origin position line next position (R_{t+1}) starts from degree 0° plus ΔR until (R) arrives to 360° degrees.

$$\mathbf{(R_t{+}1) = R_0(0^{\circ} + \Delta R) + \ldots R_{\infty}\,(360^{\circ})} \quad \textbf{(3)}$$

Thus, the (R_{t+1}) is the space or degrees that exist between each nano-endogenous variable in the Nano-Disk (j). In this case, we always need to assume that (R_{t+1}) keeps a closed interval according to expression 4.

$$[0^{\circ} \geq (R_t+1) \leq 360^{\circ}] \quad (4)$$

Subsequently, the calculation of the nano-exogenous variable in the same Nano-Disk (j) is based on the nano-arithmetic mean (α_j). Initially, the α_j is equal to the total sum of all nano-endogenous variables ($\sum\alpha_{i<R:\varsigma>}$) divided by "i" in each Nano-Disk (j) according to Expression 5.

$$\boldsymbol{\alpha}_j = \frac{\sum_{i=1} \alpha_i <\mathbf{R},_{\varsigma}>}{\mathbf{i}} \quad (5)$$

Nevertheless, we like to remind that "i" is the total number of nano-endogenous variables in analysis in the same Nano-Disk (j). From a graphical view, the Nano-Disk (j) requests that the α_j and all nano-endogenous variables ($\alpha i_{<R:\varsigma>}$) need to be joined by straight lines until yields an asymmetric spiral-shaped geometric figure with n-faces (see Figure 1 and 2). Meanwhile, any change of any nano-endogenous variable in the same Nano-Disk (j) can generate immediately a high impact on the nano-exogenous variable in our case we are referring to the nano-arithmetic mean "α_j". Hence, we can visualize graphically how a large number of nano-endogenous variables are moving all the time in different spaces within the Nano-Disk (j). At the same time, it is possible to observe how all these nano-endogenous variables can affect directly in the nano-exogenous variable behavior continuously. The second type of disk in the MDN-Mapping is the Micro-Disk (k). The Micro-Disk (k) is built by a large number of Nano-Disks (j= 1,2,3,…∞). The main indicator in the Micro-Disk (k) is based on the calculation of the micro-arithmetic mean (M_k). The M_k measurement is based on the total sum of all nano-arithmetic mean (α_j) in the same Micro-Disk (k) level divided by the total number of Nano-Disks (j) in the same Micro-Disk (k) according to expression 6.

$$\mathbf{M_k} = \frac{\sum_{\mathbf{j=1}}^{\infty} \boldsymbol{\alpha}_j}{\mathbf{j}} \quad (6)$$

The next step is to build the Micro-Disk (k) graphical representation that requests the uses of Mk and all αj need to be joined by straight lines until yields an asymmetric spiral-shaped geometric figure. Moreover, we need to find the Sub-Disk (L) main indicator that is based on the sub-arithmetic mean (δL). The sub-arithmetic mean (δL) is equal to the total sum of all micro-arithmetic mean (Mk) in the same Sub-Disk (L) divided by the total number of Micro-Disks (k) in the same Sub-Disk (L) according to expression 7.

$$\boldsymbol{\delta}_L = \frac{\sum_{\mathbf{k=1}}^{\infty} M_k}{\mathbf{k}} \quad (7)$$

The fourth type of disk in the MDN-Mapping is the General-Disk (m) that is based on the combination of all Sub-Disks (L). The General-Disk (m) main indicator is explained in expression 8. In fact, the general-arithmetic mean (Ξm) is equal to the total sum of all sub-arithmetic mean (δL) divided by the total of Sub-Disks (L) in the same General-Disk.

$$\Xi m = \frac{\sum_{\mathbf{L=1}}^{\infty} \boldsymbol{\delta}\mathbf{L}}{\mathbf{L}} \quad (8)$$

Notwithstanding, the Mega-Disk (ξ) is formed by a large number of General-Disks (m). In the Mega-Disk, it is possible to observe the final arithmetic mean in the MDN-Mapping that is called the mega-arithmetic mean. The mega-arithmetic mean can be affected anytime from the most remote nano-arithmetic mean (αj) that is located in some far Nano-Disk (j), Micro-Disk (k), Sub-Disk (L), and General-Disk (m) respectively. The mega-arithmtic mean is expressed in Expression 9.

$$\xi = \frac{\sum_{\mathbf{m=1}}^{\infty} \boldsymbol{\Xi}\mathbf{m}}{\mathbf{m}} \quad (9)$$

Nonetheless, the "m" is equal to the total number of General-Disks (m) in the Mega-Disk (ξ). The idea to propose this multidimensional coordinate mapping is to generate a deep analysis of networks that can be monitored and analyzed within the same graphical space (Ruiz Estrada, 2012). The MDN-Mapping keeps always five types of arithmetic mean: (i) nano-arithmetic mean (αj); (ii) micro-arithmetic mean (Mk); (iii) sub-arithmetic mean (δL); (iv) general-arithmetic mean (Ξm); (v) mega-arithmetic mean (ξ). Hence, the mega-arithmetic mean (ξ) is a single value that is plotted on its single vertical straight axis that is pending among all General-Disks (m) (see Figure 2 and Prototype 1). Finally, the MDN-Mapping introduces a formal and general coordinate system that can locate any endogenous or exogenous variable (point) in any General-Disks (m); Sub-Disks (L); Micro-Disks (k); Nano-Disks (j); origin position lin e (R); disk level (ς) within the Mega-Disk (ξ) see expression 10.

$$\mathbf{(m, L, k, j, R, \varsigma)} \quad \mathbf{(10)}$$

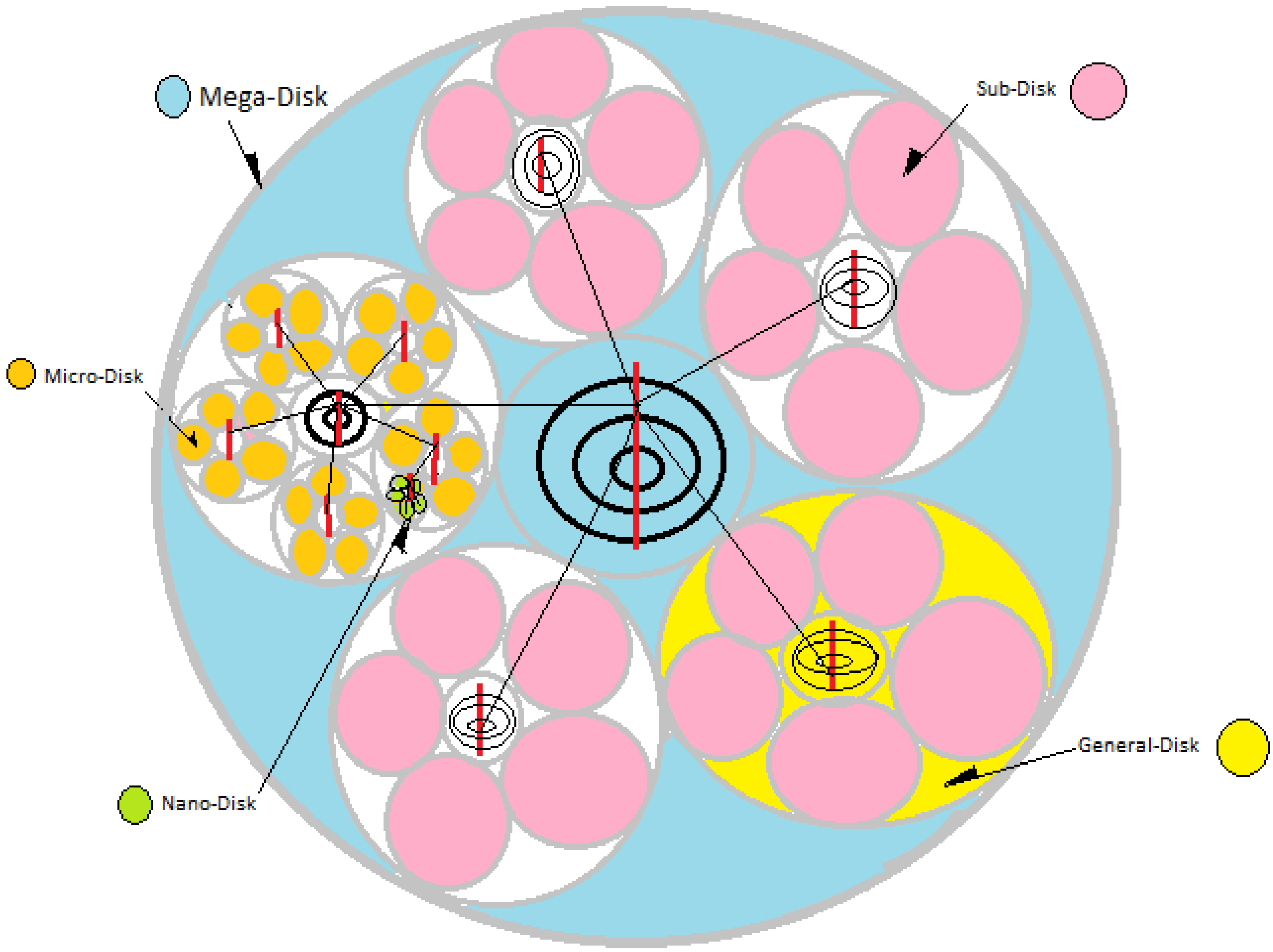
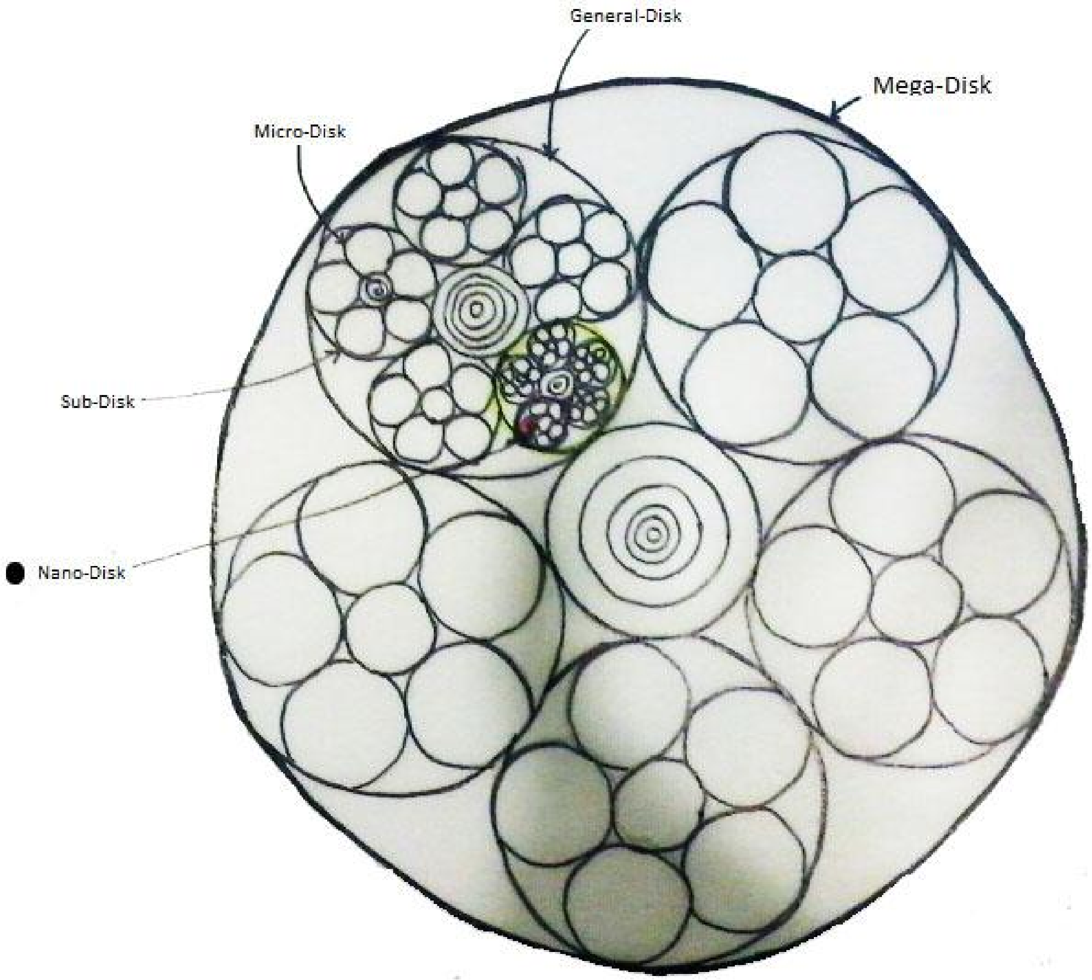


Figure 2. The Mega-Disks Networks Mapping (MDN-Mapping) Full Version
Source : Author



Prototype 1. The Mega-Disks Networks Mapping (MDN-Mapping) Prototype

CONCLUSION

This research is concluded that the Mega-Disks Networks Mapping (MDN-Mapping) can help to analyze and visualize the interconnection of a huge amount of data within the same graphical space and time according to our finals results in this research. Additionally, the Mega-Disks Networks Mapping (MDN-Mapping) can show clearly unknown dimensions that the 2-Dimensional and 3-Dimensional coordinate systems are no able to show fully complete in the analysis and evaluation of networks.

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