Inner Social Interactions Model of Big Data Impact on Economical Framework

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Aims / Objectives: This particular study is aimed to develop some proper mathematical model to justify the big data consuming economical framework with the proper social interactions. So that it can build some major key processes assessing several types of economical frames.
Study Design: Chain Phenomena Analysis
Place and Duration of Study: University of Guadalajara, Physics Department, Data Science Group.
Results: Model exposition.
Conclusion: I show how, as long as time change currently, social interaction impact on economical framework has become bigger. Big Data tools to manipulate high volume levels of information from this interactions have been a strongest platform to analyse economical indicators, such as those which repercussions affects financial stock markets. This process is modelled in this article.

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1. INTRODUCTION

An inclusive model of economical-social interactions and its repercussions on Big Data analysis is presented. The main purpose of this paper is to relate different types of human interactions inside trading and social contex, through adequate mathematical expressions, generating a reliable model. Many phenomenological topics are involved in this job, such as the idea of complexity, statistical human behavior and market structures. Complexity on social interactions is a polemic subject, and it is also a complicated phenomenon to deal with. The well known reason why creating social models is that hard is because of the large list of independent variables involved in this phenomenon [1]. It is surprising how related things are in a human systems context. Sometimes, issues to set proper logical models for society and economics come from our philosophy of perception; We live in a unified world, where the same mathematical cause-effect applied generally speaking to almost all kind of elements of a system, but for our study, ontologically speaking, we are used to see the world as a fragmented reality [2], although, we might consider reality as one single ontological object, and consider reductionism operations just as a useful methodology, but never loss sight on holistic global understanding.

Based on that principle we recognize that, all involved phenomena of social interactions have a relevant an visible transcendence over economy, evolution and behave of financial systems [2]. Therefore, we need clear models and logic formulations to express mathematical background of this phenomenon and it hidden information. Previous considerations to build this kind of models are the following.

1.1 Big Data Relevance among Social Area and Financial Response

It might be clear, that the financial area is not an isolated fraction of modern world and human structure. We think that society has financial systems as a self element. We speak about Big Data as the receptor of great amounts of information, and also a tool to predict valuable events on financial structures, from this ultimate kind of data recovery.One have to understand, that, although big data methodology arose from data structuring science, it exists a clear difference of data warehousing, size of data charts, and also the great variety in nature of data. Big Data charts kinds and extensions of files, and computational objects. Entries might be of several different kinds such as images, hypertext files, video, audio, numbers, text, etc. Advantage on this last fact is that it is possible then to consider deeper and useful information from data source (most of the times is social information came from social networks), and final predictions, no matter what data analysis method is used, primary information would have a greater quality.

1.2 Social Interactions

Society standard study show us, that society as a field is the framework for which many different kinds of human direct or indirect interactions takes place [3]. From a several variety that we can count in for a social modelling we are picking marketing interactions, which are those related to commerce and commerce strategies to increase sell of products. In general terms, we are speaking about commerce, trade and its own publicity, and those would be our consider interactions.

1.3 The Model

We visualize this phenomenon as a logical model with mathematical formalism, and we are ought to demonstrate qualitative arguments for Big Data relations as an information receptor, also as a transformation data point, and finally, as a prediction tool over Stock Markets [4]. Although we set some concrete cases as examples, our primary objective is to clarify this issue thru our model, and its chain effect from social interactions to the stock market's when Big Data is involved as an active agent.

2. SOCIAL INTERACTIONS FRAMEWORK

2.1 Phenomenological Considerations

2.1.1 Social interactions in big data

Social interactions concerning with Big Data, are just more than social decisions. They also stands for reasons about why individuals take those very decisions. Motivations, hidden information and apparently not useful data, are valuable elements on Big Data advanced analysis. One of the best advantages about it, is that, over Big Data

Set try to consider all kinds and amounts of information.

2.1.2 Human-system connection

Trading is based on a coin system. It's logic is ruled by a support system (Finance systems). Digital marketing, commerce strategies released by executives of this enterprises are also involved. Although, these interactions are based up to make decisions; whether if buying something or not. These decisions are the very vehicle to social interactions. It is known that, social interactions have a truly relevance on all phenomena of society. If we understand that, for centuries, family formation (with or without moral success) has been a pillar of society, and also, society elements are humans, and even further, humans are the ones which trade products, one can say that a great majority of actions took on stock emergent markets came directly or indirectly from social interaction sources and its information.

2.2 Mathematical Formalism for Social Interactions

2.2.1 Individuals and trading interaction

Let's say that social interaction space is given by set E, which is attached to social interaction framework, which contains, by the same way, the elements: e_i, where $i \to L$ and L is really big.

These e_i elements are the main characters in this model. These elements represents a social specific interaction. Although this same logic could be applied generally speaking to all kind of social interactions, we refer, in this model, to it, as the trading interaction. Every time a member of society buy something, under model scope, is playing the e role. Also, one notice that, despite of many of societies are not extremely big, they are usually big, speaking about size of individuals. But they are not infinite individual sets. The index i for e or what is the same e_i, stands for i times of trading action to a seller, which would be represented by e_j, and with j as an index that runs for j times of selling trading interaction. Therefore, the need of e_i and e_j elements to work out an interaction. Mathematically speaking, theese interactions (trading actions) could be represented by the mixed expression:

$$I = e_i + e_j \tag{2.1}$$

Despite of the fact that these kind of interactions, are mixed interactions, our hypothesis stands not for $e_i e_j$ but for a linear combination of them. The reason for this last fact is that, there are independent causes (from one individual with another) that leads individuals to effectuate an interaction, and those reasons and causal phenomenon might be represented as scalar variables, representing real subjective and psychological elements that affect human decisions whether if they are taking some choose or not. Chooses as trading or not decisions in a society. Then, we might fix equation

2.1 to the following expression:

$$I = \alpha e_i + \beta e_j \tag{2.2}$$

We might say that this last equation works as a proposed ansatz, and we one to see, in a further work, if it might runs correctly computationally with empirical data. This ansatz is an special one thought for this very interaction; trading options. If social interaction is different, ansatz or sample solution might be different.

Therefore we have been consider as the model basis a social interaction (trading) framework based on the existence of active individuals, and an action taken by them, some of them might choose sell e_j or buy e_i and being the main elements for interaction I . Individuals themselves are not represented by any letters, but its existence is evidently implied. Once we set linear combinations from trading operations as interaction I itself, one have to determined nature of constants α and β. This might be defined on the following paragraph.

2.3 Human Decision Connectiont

It is simple in mathematical modelling to represent phenomenon with letters, but no that easy to do it properly. Scalars α and β from equation 2.2. are scalar components of the very same phenomenon. They are mixed to the final causes of interactions, and it is obvious from linear algebra foundations, to express generating bases of social interaction framework using vectors of e_i and e_j in terms of this kind of components.

They represent a particular property of human individuals. This model does not work with the whole human being description, but with certain parts of it. Individuals have a lot of things and issues coming and going from minds [5], external agents, neuro-chemical processes, etc. The

natural step forward emerge from the question how to recognize those? and How to represent them once I recognize them?. We set a finite scalar field E with standard algebraic field properties, and without loss of generality, the same very properties to their consistent elements. These kind of elements would be α, β, γ, etc.

2.4 General Interaction Framework View

Finally, we call F to social interaction (trading) framework, composed tacitly with individuals for which actions are taking place, elements of this space indexed finitely which determined trading interactions, and a scalar field as a platform for which human decision complexity rely on.

3. INTERACTION-SUPPORT FUNCTOR

From [6] one can say that it is almost impossible to have a successful social framework if financial system is not fine and settled. Credit systems, electronic money and virtual coins have been transforming the way of how trade is made, since several years when this technology arose, until now. There is also information about the catastrophic scenario for an economical system of a country if financial system stop to support with financial items, regular population.

3.1 The Financial System as a Boundary Support to Trading Interactions

There is one more point-set, for which financial concessions to society individuals are given. Every time that a trading action have been executed among two individuals, this space can attached an inner point. We want to represent mathematically sepaking these points and how, from original social interaction points, a function f can transform these last ones in their images on this new space framework.

For all points in social framework space F relying on scalar field E it exist a set of points B called the boundary of B. And B is related to F and also under this kind of relation because B and F are not independent one from the other. Actually it happened that, same scalar for which B stands is indeed the same as F; E. This implies that:

$$\partial F = B \tag{3.1}$$

and also:

$$\partial F \subseteq F \tag{3.2}$$

Then, relation among F and B is stronger than just a regular linear isomorphism, because they share an scalar field. It is not proven yet that F and B are vectorial spaces, dough, they lies over scalar fields, and this condition is suffcient to build model.

3.2 Functor Representation

There exits a categorical function or functor f which take elements from F to B, such as in the following expression:

f: $F \rightarrow B$ (3.3) Then we can also rewrite equations in the following terms: due to function f takes elements from

F and these elements depends on inner interactions $I = \alpha e_i + \beta e_j$ then one can say that independent variable is exactly I , and strictly I (e), then function composed function would be f (I (e)) and we found

that this composition would be $I \circ f$. Therefore, last expressions might be resumed as:

$f (I (\alpha e_i + \beta e_j))$ (3.4) And writing their images in terms of domain elements of functor we express equation 3.4 as follows:

$$f (I (\alpha e_i + \beta e_j)) = f (\alpha I (e_i) + \beta I (e_j))$$

Then we have:

$$f (\alpha I (e_i) + \beta I (e_j)) = \alpha f (I (e_i)) + \beta f (I (e_j))$$

Therefore, we say that it is an existent inner interaction on space B which is $I 0$ and this interactions is an image of F inner interactions. Although, we one to remark that local inner interactions of B are not always images of F because B is F boundary. Furthermore we can rewrite equations and some of these elements of I as a set $I 0 \subset F$ and these f images from F to B are elements $I 0$:

With $\alpha f (I (e_i))$ and $\beta f (I (e_j)) \in$ B.

We conclude then, that there is a mathematically quasi-linear relation among framework space F (which depends on linear combinations representing interactions I , and specific point elements of boundary bundle B. Scalar common field E is based upon constants representing human attributes; each one of these numbers stands for an specific factor that lead individuals to take decisions. There are two kind of decisions

involved in social interaction process related with trading. The first one is about choosing whether if an individual would trade or not. In the other hand, the choice stands for decision about what does individual would trade. The how, and when is, given in a great probability by financial options defined as support space B.

4. BD FRAMEWORK

Although there is not a formal mathematical definition for Big Data, besides those sentenced by information science theory, we should try to fix an adequate formalism for it. This mean that, in regards to consider basic properties and nature of Big Data amounts of information and their data bases, we must recognize the factors involved which might affect behave of models built to represent BD phenomenon. It not only matters the facts themselves, but the number of them. We now that complexity to analyse problems increases while number of data entries and elements increases. Although Big Data and its surrounding issues are matters of complexity, one can divide these last mentioned factors and deal with them by separated.

4.1 About Data Size

Data size matters. Speaking about business intelligence, there is a several difference among regular business research information of an enterprise or commercial system, and Big Data business intelligence ambitions. Sources of information are multiplied. We are not only speaking about accounting numbers or financial market states in its technical language. But furthermore, we speak about deep indirect reasons which society individuals take as options and decisions in order to buy or not an item offered by a specific company. There are more than just technical inner factors for companies while we focussed this issue since business intelligence and BD approach. From this point of view, it also matters the human unpredictable factor. And this factor, add complexity to BD based models. This is because information amounts increases, so processing times and operational process might be greater.

4.2 On Data Types

Data size problem grow in complexity at the time when this new levels of information takes place, but also these are conformed by different kinds of data. Data might be warehoused as images, videos, audio files, different kinds of file extensions are involved, images, special code files, etc. All these data might be analysed carefully and, even pay it more attention in order to obtain valuable information and predictions from it.

5. MODEL FORMULATION

We represent BD methodology as a categorical function. This function might represent properly as a mathematical object this BD structure [7]. A possibility might be consider as it, a matrix structure, projected from higher dimensions, and came from data base. This would be a BDnm. n = m therefore a matrix of dimension n^2 . We propose that this model with take information from a social interaction phenomenon to a Big Data framework. Now, it is necessary to connect this information object with a social interaction function. And this function comes from equation 3.3. But there is also one more element to add, which would be a human factor element once again. This would be different from scalar constants added to equation 3.4 but of the same nature. This term would be represented by κ. Equation model is given by equation 4.1 as follows:

$$BDnm = f(I) + κ \quad (5.1)$$

This model is a quasi linear model, and could be turn into a dynamical system if we vary with respect time the first term of equation. Computing for right side of equation can be reached thru algorithms for matrices and also potential thermodynamic tools, in case of κ, which we might define a measure for complexity.

5.1 Applications to Stock Market

Even there was not a clear intention to obtain results from stock markets at the beginning of this research, it is evident that the best information sources for stock market decisions and predictions comes from social human factors [8]. After all, stock prices of emergent markets are the result of long chain processes from social interactions.

6. CONCLUSIONS

We set a framework to consider mathematically speaking, a formal representation of social interactions within a closed context of social frame. And then we defined a natural function from this last framework to a support financial platform based on banking finance options. This social interaction has been consider only in its trading option and we relate this valuable,

different and big size information to a BD structure, considering also the human factor, just as the causal agent of trading options.

A complete model could be a model that considers as social interactions more factors than just trading. Although we are working to applied this model and test it with concrete data bases and real examples. This set of scalar constants defined with κ might have empty entries waiting to be filled with experimental data and empirical tuning. Stock Markets one have a better option about predictions then a social interaction based model. We are not saying that this model puts aside regular methods for stock market predictions, but, perhaps this new approach would helps to this purpose.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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