FIXING SOCIAL NEEDS THROUGH INTEGRATED SYSTEMS

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ABSTRACT

Research in addressing issues involving the development of new methods of reasoning such as reasoning analogical, reasoning based on probability theory and decision theory or on reasoning from case studies. Modeling the real world closely follows the line of development possibilities offered by computer programming. From unstructured programming and to programming objectual knowledge offered each time new methods of interpretation and modeling world.

Current intelligent systems are integrated. They are characterized by the principle of introducing multiple unique data and processing them according to user-specific information needs.

The main feature of object models - consistent treatment of events, data and methods to process them - leads to the idea that knowledge base and inference engine should be consolidated into a single entity. This unification is not satisfactory, because it contradicts another principle of object programming. This principle involves separation systems entities with properties, methods and specific events and interactions between entities by modeling interdependent and messages.

Needs, society needs evolve over time and space. Multitude of products, services, covering the needs of consumers, largely influences the producers, resulting in supply and demand.

Denote by \( A = \{1, 2, \ldots, \alpha, \ldots, a\} \) - economic subject, the multitude of products, services needed by society.

Denote by \( B_0 = \{1, 2, \ldots, \beta, \ldots, b\} \) - the set of products, tech service, for market.

Under the impact of economic development, some products from the set \( B_0 \) in time are subject to changes or improvements. Product \( \beta, \ \beta \in B_0 \) will consist of \( B_\beta \) changes. Market, the company will meet consumer products, services, plus initial amendments thereto. Denote by \( B = \{B_1, B_2, \ldots, B_\beta, \ldots, B_b\} \) - set of products, services tech reference to society, consumers.

We recognize that economic subject \( A \) has capital \( K \) you can invest part \( (K - k < K) \) or total \( K \) in the activity \( B \), which may increase its capital by \( C \), if considered not appear in social problems, it may reduce its capital by \( C \), if in that place social issues. Note the lack of social needs by probability \( p \), this occurs by \( q = 1 - p \). After the first year economic subject will get a capital equivalent to:

\[
p(K + C) + q(K - C) = pK + pC + qK - qC = (p + q)K + (p - q)C = K + (p - q)C
\]

If the likelihood of avoiding social needs \( p \) is less than the probability of remaining social needs \( q \), then the mathematical expectation of economic capital subject \( A \), after a year of activity will be reduced, if \( q > p \), then capital will likely increase.

Economic subject can make the relevant calculations for a range of 1; 2; 3... years.

Availability of capital - \( K \) monetary units, the first year economic subject can invest \( C \) monetary units, where \( C \leq K \). This year the probability of \( p \) will have a capital of \( (K + C) \) and the probability of monetary units \( q \) the floods will lose \( C \) monetary units and capital have not \( K \) but \( (K - C) \) currency units. Mathematical expectancy of the capital will be probably a year:

\[
p(K + C) + q(K - C) = pK + pC + qK - qC = (p + q)K + (p - q)C = K + (p - q)C \tag{1}
\]

From equation \( 1 \) we find: if \( p > q \), the economic issue \( A \) continue to examine the conduct of such business version of any social issues around: if \( p \leq q \) when the subject of economic \( A \) refuses to make investments.

Let us examine the case \( p > q \). Investor \( A \) with the available \( K \) establish its business strategy in the first year:
Investor \( A \) accepts \( C = K \), then over a year he will have:

\[
p(K + C) + q(K - C) = p(K + K) + q(K - K) = 2pK
\]
capital that can be achieved with maximum likelihood \( p \). But investment \( C = K \) can be lost due to high social protection.

Maximum losses are negative earnings, well \( C = -K \). In this case:

\[
p(K + C) + q(K - C) = p(K + (-K)) + q(K - (-K)) = 2qK
\]

In the second year economic subject \( A \) may have capital worth \((K + C)\) or value \((K - C)\). With probability \( p \) economic subject \( A \) calculated its maximum capital after two years of economic problems arising around:

\[
p((K + C) + I) + q((K + C) - I) = p((K + C) + (K + C)) + q((K + C) - (K + C)) = 2p(K + C)
\]

maximum capital that can be achieved with probability \( p \). Examining the first year loss, the investor shall keep
under review negative earnings \(-(K - C)\):

\[
p((K + C) + I) + q((K + C) - I) = p((K - C) + (K - C)) + q((K - C) - (K - C)) = 2q(K - C)
\]

probable maximum loss from high social protection.

In the third year economic subject \( A \) may have capital of \(2p(K + C)\) with probability \( p \). The maximum value achieved in the third year will be:

\[
p(2p(K + C) + 2p(K + C)) + q(2p(K + C) - 2p(K + C)) = 4p^2(K + C)
\]

Expected losses, that earnings negative will be \(I = -2q(K - C)\).

Maximum loss will be:

\[
p(2q(K - C) - 2q(K - C)) + q(2q(K - C) - (2q(K - C))) = (2q)^2(K - C)
\]

So, during economic capital subject \( A \) evolves as follows:

1. \( p(K + C) + q(K - C) = p(K + K) + q(K - K) = 2pK \)
2. \( p(2pK + C) + q(2pK - C) = p(2pK + 2pK) + q(2pK - 2pK) = (2p)^2K \)
3. \( p(4p^2K + C) + q(4p^2K - C) = p(4p^2K + 4p^2K) + q(4p^2K - 4p^2K) = (2p)^3K \)

... 

t. \( p((2p)^t \cdot K + C) + q((2p)^t \cdot K - C) = p((2p)^t \cdot K + (2p)^t \cdot K) + q((2p)^t \cdot K - (2p)^t \cdot K) = p \cdot (2p)^t \cdot K - (2p)^t \cdot K = (2p)^t \cdot K \)

After \( t \) years subject to economic activity \( A \) around social issues will be likely to increase capital:

\[
\lim_{t \to \infty} (2p)^t \cdot K = 0, \text{ because } p < 1
\]

After \( t \) years the investor will become BANKRUPT.

A first conclusion is that long-term investment in a company that supports social assistance at the expense of production are not recommended.

Capital over a year of activity will be:

\[
p(K + C) + q(K - C)
\]

In expression (2) investments \((K + C)\) and \((K - C)\) we will substitute with their logarithms. The expression (2) will take the form:

\[
V = p \ln(K + C) + q \ln(K - C)
\]

where \( C \) - the volume of investments that have to accept the economic subject \( A \).

Maximum value of expression (3) a condition determined from:

\[
\frac{dV}{dC} = 0, \text{ namely}
\]

\[
\frac{dV}{dC} = \frac{p}{K + C} - \frac{q}{K - C} = 0 \text{ where do I get:}
\]
\[ \frac{p}{K+C} = \frac{q}{K-C} : p(K-C) = q(K+C). \]

The result can be interpreted geometrically (fig. 1).

\[ C \quad K \quad q \quad C \quad K \quad p \]

\[ C \quad K \quad C \quad K \quad p \quad q \]

**Fig. 1. An interpretation of investment**

In fig. 1 \((K+C), (K-C)\) - serve "arm";

probability \(p\) and \(q\) - weights

Investments should be:
\[ p(K-C^*) = q(K+C^*) \]
\[ pK - pC^* = qK + qC^* : C^*(p+q) = K(p-q), \quad p+q = 1; \quad C^* = K(p-q). \]

In equation (3) contained expressions \((K+C)\) and \((K-C)\). Determine:
\[ K + C^* = K + K(p-q) = K + Kp - Kq = (1-q)K + Kp = Kp + Kp = 2Kp \]
\[ K - C^* = K - K(p-q) = K - Kp + Kq = (1-p)K + Kq = Kq + Kq = 2Kq \]

The expression (3) has the form:
\[ V = p \ln(K+C^*) + q \ln(K-C^*) = p \ln 2Kp + q \ln 2Kq = p(\ln 2 + \ln K + \ln p) + \]
\[ + q(\ln 2 + \ln K + \ln q) = p \ln 2 + p \ln K + p \ln p + q \ln 2 + q \ln K + q \ln q = \]
\[ = \ln 2(p+q) + \ln K(p+q) + p \ln p + q \ln q ? \ln K + \ln 2 + p \ln p + q \ln q = \]
\[ = \ln K + \ln 2 + p^q q^q \]

where - \((p \ln p + q \ln q)\) in information theory is called entropy communication.

A second conclusion is that to determine the amount of investment in a company that supports social assistance at the expense of production is necessary to know the probability \(p\) and \(q\). The amount of investment is in direct dependence on the difference of these probabilities.

Of system
\[ \begin{cases} 
 p + q = 1 \\
 p - q = \frac{C^*}{K} 
\end{cases} \]

determine \(p = \frac{1}{2} + \frac{C^*}{2K}\), which can be made the investment decision.

Producers of goods (products) and services at the expense of profits made can extend their activities. But the emergence of performance technologies, new principles, the need for costly changes to products, services may require costs that exceed those available in the manufacturer. In these cases, producers are using credit and financial markets. Depending on a number of financial market credit factors may be: poor, with low efficiency, with moderate efficiency, with greater efficiency.

Financial market and credit all participants are at a loss, then we can say with certainty that the market is weak, if the financial market and credit some participants are always the same gain, then that market is poor.

**BIBLIOGRAPHY**