Information Value Evaluation Index System

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Abstract. The flow of information has never been as easy or wide-ranging as it is today. I are tasked to explore the evolution of the methodology, purpose, and functionality of society＇s networks by taking a historical perspective of flow of information relative to inherent value of information.the speed of information grows largely because of technology development. And information inherent value and the transmission capacity of initial nodes counts a lot in spreading information.

I develop information value evaluation index system to evaluate the value of information, which has two indicators. One of the indicators is the value of information content and another is the quality of information's editorship. The larger value is, is there more possibility to affect public mind. In addition, i simulate our model with 3 actual events to validate its feasibility. I conclude that stock market crash will influence public opinion much than other two events.I consider some factors which have influence on spreading information and public opinion, including information inherent value, people's initial opinion and bias, form of the message or its source, and the topology or strength of the information network in a region, country, or worldwide.

Introduction

In this era of information explosion, it needs to be cleared that information is not equal to news. The fast spread of information sometimes is on account of the inherent value of the information itself. Besides, the specific way of spreading, such as special groups of population, may also contribute to the high flow of information through social media. With such easy way to spread the message but without much consideration to the importance level of information, it becomes to be our tasks to think more about the relationship between flow of information and the inherent value information.

During the past decade, considerable effort has been expended on the design and implementation of computer-based information systems. Parallel to this work has been the development of techniques and methodology for testing the performance of these systems and for comparing systems, or components of thest: systems.

While most researchers agree that there is a need for one value, or index, which adequately described a system's performance, there appears to be no general agreement as to either the factors which should be measured or the index which should be used for this performance measurement. As a result, the literature of information system evaluation contains independent reports of performance which cannot be correlated or compared. These reports generally provide littl, information upon which to base either operational decisions or subsequent research in information storage and retrieval techniques[1].

In 1927, Kermack and Anderson created an epidemic model in which they considered a fixed population with only three compartments, susceptibles, infected, I, and removed, R, that is the SIR model[2]. Then, the SIR model was developed to many extensions, the SIR models with births and deaths, the SEIR model with latent phase considered, the MSIR model considering babies born with a passive immunity from their mother . In 2013, Ruzhi Xu et al structure S-SEIR to study the value of the dissemination of information itself and the user behavior on the influence of information dissemination[3].

In 1999, Alexander. J. E. and Tate. M. A study how to evaluate and create information quality on the web[4]. In 2000, Martin. J. Eppler reviewed information quality frameworks from the past ten years[5].

Public interest and mind are often easily disturbed by outward things. The information influence on networks counts a lot in today's society. A model that demonstrates how public interest and opinion can be changed through information networks in today's connected world is necessary.

Definition of information and news

With the popularity of mobile devices, almost every single one of us is easy to send information. Some of the information will attracted great public attention, while others may receive no response. News is a special form of information, so we can say it comes from information. But not all information have qualification to become news. In order to filter what qualifies as news, we need a clear definitions about information and news.

● **Information:** There are information when something happen. Everyone can be the source of the message. And there is no difference between the big events or small things happening surrounded us so long as they can be spread.

● **News:** differ from information, news need more conditions. We consider two main factors here. First, the inherent value itself possesses determines the importance of it. More valuable the information is, the more possibility it qualifies as news. Second, those people who spread information at first counts a lot. A person with influence and appeal is more important than those who are nobody. It's another condition that affects information to filter as news.

Establishment of Model

In today's society, information as a strategic resource and factor of production is gradually become the basic of social functioning, the lifeline of enterprise development and the footstone for managers from various business to make decision. How to evaluate information value and make use of information reasonably and effectively has become hot spots and focus in the field of the modern information science. People always change their interest and opinion easily under the edification of mainstream ideology.

In this paper, i define the information as the criterion of the degree of how information change public interest and opinion. I put forward information value evaluation index system and determine the weight of each index by analytic hierarchy process, and build the fuzzy synthetic evaluation model of information value.

I consider from two aspects to represent the value of information.

One is the value of information content which show the inherent value of the event itself. It's a key attribute of information value. I choose 7 indexes to depict it, respectively are: significance, timeliness, accuracy, integrity, foreseeability, necessity, novelty.

Another is the situation of writing information. Information quality of writing will directly affect efficiency information can produce. The writing of the information quality including 5 indicators: the clarity of the subject, thinking meticulosity, accuracy of words, expression of simplicity, elements of the comprehensive.

I express the degree of these indicators in numerical as table 1.

Table 1 the information value of comprehensive evaluation index and its weights

First class indicator	Second class indicator	index weight
The value of information content	significance	0.15
	timeliness	0.2
	Accuracy	0.1
	Integrity	0.1
	foreseeability	0.1
	Necessity	0.15
	Novelty	0.2
The quality of the information writing	the clarity of the subject	0.203
	thinking meticulosity,	0.063
	accuracy of words,	0.299
	expression of simplicity	0.232
	elements of the comprehensive	0.203

To simplify the description, i denote first class evaluation index as $U = \{u_1, u_2\}$. u_1 and u_2 represent the value of and the quality of the information writing respectively. U_1 represents the set of 7 indicators of information content value and U_2 represents 5 indicators of information writing's quality. Evaluation sets is denoted as $V = \{v_1, v_2, v_3, v_4, v_5\}$ which represents different meaning of evaluation. Evaluate every factors of U_1 and U_2, then i have fuzzy mapping f_1, f_2, from U_1, U_2 to V and induce fuzzy relation $R_i \in F(U_i \times V), i = 1,2$.

In reality, generally it is panelists who evaluate these indicators of the information value, then structure evaluation vectors of each indicator and fuzzy matrix according to result of evaluation. For example, the vertex of i indicator of U_2 is $(r_{i1}, r_{i2}, r_{i3}, r_{i4}, r_{i5})(i = 1,2,3,4,5)$, then fuzzy matrix of the corresponding indicator U_2 is

$$R_2 = \begin{bmatrix} r_{11} & r_{21} & \cdots & r_{15} \\ r_{21} & r_{22} & \cdots & r_{25} \\ \vdots & \vdots & & \vdots \\ r_{51} & r_{52} & \cdots & r_{55} \end{bmatrix}$$

where $r_{ij} = \dfrac{\text{number of people give level j}}{\text{total number of specialist}}$ $(i = 1,2,...,5, j = 1,2,...5)$.

The evaluation vector of first class factor of information value respectively are

$$V_1 = W_1.R_1 = (v_{a1}, v_{a2}, ..., v_{a5}),$$
$$V_2 = W_2.R_2 = (v_{b1}, v_{b2}, ..., v_{b5}).$$

Hence, the evaluation vector of information value can be further available.

$$C = W.\begin{pmatrix} V_1 \\ V_2 \end{pmatrix} = (v_{c1}, v_{c2}, ..., v_{c5}).$$

The larger the value of v_{ci} is, the larger value of information i possesses, so people are more likely to change their interest and opinion after receiving the information.

Simulation with Actual Information

Assume that a newspaper office received three messages:

A: Oct 12, 2015, Tianjin Binhai New Area Explosion,

B: June 1st, 2015, "Orient Star" sank,

C: June, 2015, China stock market crash.

I does fuzzy assessment to these 3 information by simulating the evaluation from 12 specialists in the computer. The result is presented in Table 2.

Table 2. Grade of each class's evaluation

	v_{c1}	v_{c2}	v_{c3}	v_{c4}	v_{c5}
A	0.027	0.13	0.482	0.295	0.066
B	0.367	0.521	0.112	0	0
C	0.758	0.238	0.004	0	0

So, according to Table 2, i can see information C has great value, the value of information A has lower value, and information B has lowest value. Information C is strong in importance, accuracy and necessity. So it's regard as the information with very large value. Information A has both advantages and disadvantages in different index, it's regard as information with large value. The grade of all sub-index to higher rank evaluation of information B is not large, so it's information with no much value.

Therefore, information C has great influence on public opinion and decision. Actually, the result is consistent with reality.

Summary

Actually, there are huge amount of misinformation flooding in the networks. The misinformation flow may be different from information. But in this paper, i doesn't discuss this situation.To evaluate how information influence public opinion, i consider that higher information has effect on public minds. Under this condition, i develop information value evaluation index system. And i discuss two factors will affect the information value, of which has 7 and 5 sub-indexes respectively.I simplify the discussion about how information influence public opinion. Information value is as the only criterion for evaluation.

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