Study on Spam Endurance Index in On-line environment

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Abstract: Spam has been anxious problem on cyber security area for a long time. Several international organizations and security enterprises strive to reduce physical amount of spam by developing legal regulations and anti-spam software. But email users still think that spam messages don't decrease at all. Thus it is important to understanding the gap between actual volume of spam and the feeling of the volume. In this study, we emphasize the importance of measuring the attitude toward spam and propose exploratory model to measure spam endurance index.

Key-Words: spam, spam endurance, attitude toward spam

1 Background

The enlargement of on-line space brings big change of our daily life. Banking, shopping, healthcare service which can be possible in real life bacome possible through internet. In vertue of internet, Our quality of life is getting better than ever. On the other hand, those enpansion induce internet environment pollution like private information leakage, virus and hacking. Spam is particulary serious problem bacause which contains not only commercial advertising but also adult contents, bank fraud and sent indiscriminately. Internal and external organizations endeavors to develop technical firtering methods and legal regulations in order to reduce spam. But email use still have a feeling of spam increased.

Thus, the major point of solving spam problem is not the actual volume of spam which user receives but user's feeling of spam. In this paper, we first look into online environment pollution caused by spam. Then we question the gap between actual spam volume and feeling of volume user received and propose the necessity of measuring spam endurance score.

2 On-line environment pollution according to spam increasing

Butler(2003) defines spam as unsolicited bulk email, or junk email, typically coming from organizations we neither know nor want to know. Butler differenciates spam from mass emails sent by companies to communicate to established customers, noting that an electronic message is spam if:

- the recipient's personal identity and context are irrelevant because the message is equally applicable to many other potential recipients;
- the recipient has not verifiably granted deliberate, explicit, and still revocable permission for it to be sent, and;
- the transmission and reception of the message appeaers to the recipient to give a disproportionate benefit to the sender.

From the sender's perspective, the cost of promotion of service or product is much cheaper than direct marketing. Further, the reach of a spam campaign is virtually limitless so the ability to obtain email address lists is matter.

Because of these features, Spam mail is indicated the most polluting factor of online environment. The most serious problem is that spam mail is sent anybody who has email address regardless of receiver's gender or age. The McAfee Americans and Spam survey(2003) ranked pornography as the type of spam message most frequently received by consumers, followed in order by refinancing, credit counseling, and sexual enhancement products. This product list appears somewhat targeted toward working age males, but teenagers also receive those mails and expose to pornography. Older individuals are considered to be at higher risk for various types of fraud because of both social and cognitive

factors(Cohen, 1998), in addition to showing less general ease in using computer(Zhang, 2004).

Moreover, increasing spam mail get mail server administrators discouraged and email users are exposed to private information leakage and virus infection. Also spending time on cleaning spam mail continues productivity reduction(Grimes et at., 2007). Thus 53% of email users said spam has made them less trusting of email and 22% said that spam has reduced their overall use of email(Fallows, 2005).

3   Developing spam endurance index

3.1 The necessity of developing spam endurance index

In 2004, OECD established taskforce team to secure the countermeasure for the increasing spam mail and has been trying to make the regulation to cope with the spammer. EU directive also enforced the prohibition of illegal spam mail. And a number of information security companies have been trying to develop various types of anti-spam software. With these kinds of efforts, there is a great progress these years for anti spam.

But we still don't have a sufficient knowledge about the user's subjective experience and response behavior for the spam. According to the data from Korea Information Security Agency, the number of spam has been decreased these years, but Internet users don't feel like that way.

Table 1. average number of spam which user receives per day

category	'04.7~12	'05.1~6	'05.7~12	'06. 1~6	'06.7~12
Adult	1.2	0.9	0.6	0.6	0.2
Loan/Insurance	6.3	6.9	1.8	2.7	3.1
General	6.3	7.5	4.5	2.1	2.0
Total	**13.8**	**15.3**	**6.9**	**5.4**	**5.3**

The most important reason of the gap between the actual spam index and the endurance spam index is the possibility of users to regard some mail as spam which is not illegal. Sometimes users simply regard mails which were sent in large quantities as spam mails. Therefore it is necessary for us to research

about the user's spam mail conception. Secondly, it is possible that response for the spam mail is multidimensional, but we didn't have any research about that area. Therefore it is necessary for us to study about the users' perception on the spam with systematic methodology and develop the spam endurance index. Thirdly, the definition of spam, the number of spam, cognitive risk on the spam can be variable with the age, sex, the level of computer usage skill, control power on the spam mail. So it is necessary to search and reflect systematically these kinds of lower group's characteristics.
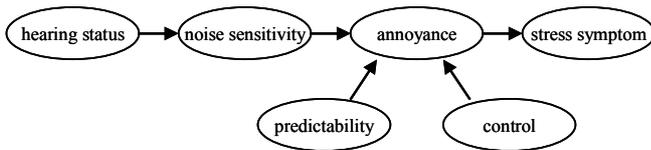
3.2 The characteristics of spam endurance index

In satisfaction measurement, which is measured consumer's satisfaction about buying products or service voluntarily, it reflects correspondence between real experience and consumer's static expectation about service or products. But spam mail is an experience unexpected information, it is basically non-expectation negative experience before receiving spam mail. In other words, negative experience of spam mail is discouragement, fear and annoyance, which has high possibility of non-opposite concept in the level of satisfaction. The kernel of endurance spam mail endurance is measurement of emotional experience, 'spam rage' means showing temper after receiving spam mail, acts on long-term stress and it bring about a result of reducing productivity. In spite of huge negative emotional effect to spam mail receiver, it is no research of emotional effect.

In research of spam mail endurance, it looks useful method benchmarking from noise research. Experience of 'noise annoyance' when exposure to unwanted environment like noise and vibration is important to consider psychological, social, cultural factor besides intensity and frequency of stimulation.(International symposium about noise contamination in the cities. (Madrid, Spain. 2002))Lim et all (2007) showed that annoyance related to stress mechanism and negative emotion like disturbance, complaint, dissatisfaction, harassment, nuisance, discomfort, vexation, hate and uneasiness.
Enmarker and Boman(2004) showed multidimensional structure of annoyance in the annoyance model about noise.

Fig 1. annoyance model of noise

Focusing of noise annoyance and analyzing this model, hearing status is input variable, annoyance of noise is consequence variable. But they do not connect directly, include one mediator and two modifying variable. That is, noise sensitivity means mediator, and suppose regulation variable to predictability and control of noise.
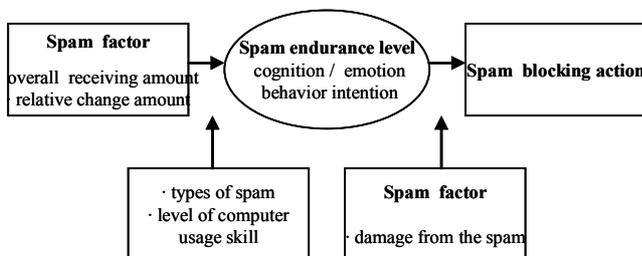
This model is on the basis of Lazarus and Folkman (1984)'s study. According to that, stress induction factor causing negative result depends on two primary factors: 1) how threaten induction factor threaten 2) individual ability against threat factor. It is important to knowledge and control ability about threat factor and emotional experience of spam mail can also predict similar structure.

4 Causal model for spam endurance analysis

4.1 Multidimensional spam endurance index model

We can expect that the emotional experience on the spam can be similar with the research about noise. It is necessary to inspect the relationship of detailed factors comprehensively the relation among spam factor, spam endurance level, spam blocking behavior and types of spam, level of computer usage skill, damage from the spam.

Fig 2. causal model of spam endurance

We develop this attitude model on the spam with using psychological attitude model which assumes attitude on the specific object is composed of the

three factors: cognition, emotion and behavior. In this model, attitude toward the spam change according to the spam mail related environmental factors of overall receiving spam amount and relative receiving spam amount. We assume that types of spam and level of computer usage skill act as a mediator variable. For example, we can predict if someone who usually receives a lot of spam mail and the amount of the mail is increasing, has the negative thought/emotion and high intention to response to spam mail. Therefore it is possible for someone like him to do the spam blocking action.

Therefore it is predictable that overall spam endurance level is changeable with those two mediator variable, types of spam and level of computer usage skill. And it is predictable that spam blocking behavior is changeable with the other adjustment variables, the past experience of damage from spam.

4.2 Measuring attitude toward spam

This model construct the degree of spam endurance and examine the relationship between spam factor and spam blocking behavior in point of attitude toward spam. Measuring spam endurance degree is based on the psychological background.

In psychology, attitude toward somthing is defined as constitution of cognitive, affectice and behavioral factor. For example, in the noise study, cognition is something that people's knowledge, thinking or belief about physical stimulus like noise. Affection, the other hand, the general emotional response about noise. Finally, behavior is people's acting intention or tendency about noise.

On thses theoretical ground, attitude toward spam as normal stressor, can be defined below :

● cognitive factor : measuring three dimension of
  imformative usefulness of spam, danger of spam, controllerbility by receiver.
● affective factor : measuring three dimension of annoyance, anger, anxiety of spam(Lazarus, 1993; Huang,2007).
● behavioral factor : measuring three dimension of avoidance, negative response, aggresive reponse of spam(Carver et al., 1989 ; Folkman

et al., 1986).

The average score of these three factors means the degree of spam endurance. This index reflect negative attitude of spam, so incresed score means the degree of negative endurance increasing. Besides demographical variables, analysing by types of spam and level of computer usage skill can be useful because what kind of group is specific in three cattitude factors. As a result, we can use those data establishing spam policy targeting specific group.

5 Conclusion and future works

We examined the risk of spam which is one of the most serious pollutants in cyber space, efforts to reduce the spam mail so far. And also we examined that the spam endurance model to measure the users' emotional characteristics which regards spam mail as one of the most troublesome problem regardless of the amount of spam mail. In this model, the most important thing is to be careful with the selection of the factors to be measured. And furthermore, we should be careful with the period of measurement because emotional experience is not usually changed.

In this research, we didn't think about the types of spam which is recognized by users as spam. Hereafter, additional research on the spam types should be needed. There can be significant separation between legal definition of the spam and users' recognition of the spam. Therefore it is necessary to construct the questionnaire for the spam endurance measurement through more systematic survey item selection and appropriate procedure.

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