For office use only	Team Control Number	For office use only
T1 _____	**88508**	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	**F**	F4 _____

2018 ICM Summary Sheet

A Smart Privacy Commodity: a Quantitative Model of Dynamic Pricing Strategy

This article presents a model to precisely quantify the price set and risk of private information(PI), and with it we can get the optimal strategy of the privacy management.

To precisely quantify the price set of PI and get the optimal strategy of the privacy management, we innovatively decomposed our model into two sub-problems, they are **model of PI price set** and **model of privacy risk**.

First, we created the model of PI price set on individual scope, community scope and nation scope. At the first step, we gathered the basic characteristics of individuals in the domain of social media, financial activity, medical care and e-commerce, and defined the PI, PP, IP given in task 5. We weighted **combination of entropy method** and **AHP** and decided the weight of the four domains. Then based on **TOPSIS comprehensive evaluation method** and **PI's consistency tradeoffs,** we built the model of privacy price set on individual scope. At the second step, to precisely measure the price set of PI on community scope, we learnt from the **multiway tree theory** and divided people by their age, occupation, income to make our sub-community have the similar characteristic. Considered the requirement of task, we precisely quantified the **risk perception** (which is determined by privacy type, generational differences, network effects, data breach and community difference). From generational differences we can launch a conclusion that people in 20-30 years old are most willing to share their information, and the tendency is decrease by the age turns old. The data breach will lead a heavy reducement of the willingness of information share, and can hardly resurgence in short time. Considering the time factor, we combined the risk perception and **markov chain model**, and got the **dynamic alter process** of the risk perception by the year. In the calculation of the matrix of transition probability, we used the **bayesian theorem**. Then we combined the model of privacy price set on individual scope and model of risk perception and got the price set of PI on community scope. At the third step, we analyzed the price set model on nation scope from three aspects. They are market aspect, policy aspect and culture aspect. On the market aspect, we used the **bayesian nash equilibrium**; On the policy aspect, we considered the macroscopic readjustment and control policy, privacy authority policy and strike information leak and illegal transaction policy; On the culture aspect, we considered the atmosphere of information transparency. From the analysis we got the price set model on the nation scope, the amount of all four domains is 783$.

Second, for the risk model, we qualitatively analyzed the different type of risk which faced by different community in different domains, and measured these risks. Then we answered the question given in task4, task6 and task7.

In addition, we used **real data** to examine our model. The inaccuracy of our model is no more than 0.17, which means our model is highly practical. We also put our model through **error analysis** and **robustness analysis**. The outcome shows our model has well robustness, which means our model is highly reliable. At last, we summarized our advantage and weakness, and blueprinted further development.

The innovation of the article is that we consider enough factors. Besides, in the **logistic model** of network effects, we randomly chose 2012 and 2032 year, then using visualization method to compare their variation, and answer the question in task 6. We considered PI in different domains have different influence (good for public interest or harm national security), and **quantified the external effect**, which made our model **optimized**. In conclusion, our model answered all the given questions, and has its creativeness and practicability.

Keywords: Pricing Model of PI; Risk Model of PI, Topsis Method; Markov Chain;

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