The Design of Paper-medium Products Printing Anti-counterfeiting System

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Abstract

This paper puts forward an anti-counterfeiting printing method based on paper medium, and takes the prevention of pirated books for example. To verify and design the authentication code of books through hash algorithm, combined with the computer and network communication technology, the method conducts local and remote interrelated verification to achieve the purpose of making the pirates unable to produce pirated books in batches, so as to curb the economic benefits brought by piracy and crack down on piracy fundamentally.

Keywords

Hash Algorithm, Anti-Counterfeiting, Printing.

1. Introduction

Piracy has a long history. Especially for books, piracy is like the shadow following them. Just three days to a week after the book issue, batches of pirated products of the same version will appear. Despite the fact that many countries have taken the anti-piracy measures against piracy to a certain extent, so far, piracy has not been effectively eradicated, but it has been spreading increasingly instead. Book piracy not only harms the rights and interests of authors, publishers and readers, but also results in the loss of tax profits, and harms the interests of the state and the society as a whole [1].

At present, methods to distinguish the legal copies from pirated books are often limited to visual observation, such as observation of paper texture, printing effect, and the neatness of the bookbinding process,etc.; or the press adopts some so-called anti-piracy measures, such as laser anti-counterfeiting marking, title letterpress printing, title page watermarking, and color page insertion. However, because these technologies only immobilize some locations' partial information, but do not have exclusive nature permanently; and therefore, they are easy to be copied and forged after a period of technology circulation. More importantly, the abundant economic interests stimulate the pirates to risk danger in desperation. Piracy only needs to pay the cheap printing cost without paying tax and the contribution fee, which makes production of pirated books become the means of gaining profiteering by illegal operators. Therefore, the behavior of selling pirated books continues to prevail despite repeated prohibition, and the existing measures fail to effectively crack and curb piracy fundamentally [2,3].

Computer and communication technology are becoming mature gradually, and it is imperative to crack down on and prevent the pirated books from being printed by applying computer and communication technology together. In particular, to crack down on piracy and curb the economic benefits brought by piracy can effectively prevent piracy and make piracy unprofitable, finally achieving the goal of curbing piracy [4-6].

This paper puts forward an anti-piracy method, the anti-piracy authentication code to realize the anti-piracy of printing media, books, for example. Hide an anti-piracy authentication code which is random, unpredictable and satisfies the specific hash function in a special book location. And the code can only be taken out unless an irreversible and destructive operation is conducted. In combination with computer and network communication technology [7], the books are processed with an interrelated verification [8], to achieve the purpose of preventing the pirates from producing pirated books in large batches and curbing piracy effectively.

2. System Construction

The design though of this scheme is shown in Figure 1. Hide the interrelated anti-piracy authentication code with certain function relations in book printing and packaging as needed, and store the code in the authentication system database; when the end rights and interests-holder conducts authentication, take out the anti-piracy authentication code hidden in the books through irreversible operation, and send the anti-counterfeiting code to the authentication system through telecommunications network by query methods such as telephone, mobile phone or network, the authentication system will authenticate the codes according to the anti-piracy authentication code and judge that the copyright of the book. The specific process is presented as Fig.1.

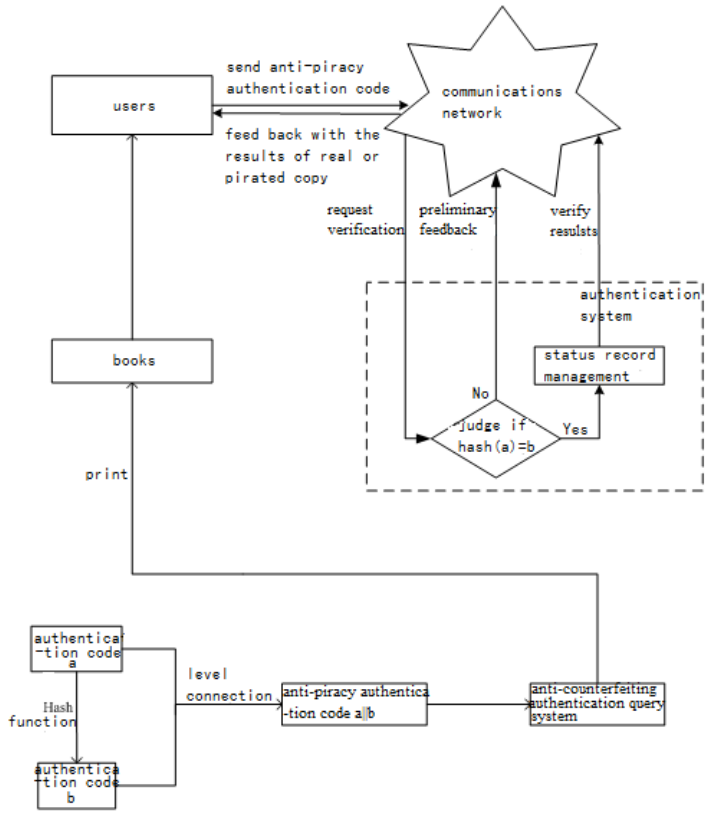

Fig. 1 The system construction

2.1 The generation of anti-counterfeiting codes 2.2 The authentication of anti-counterfeiting codes

The following part will take paper-medium printing products for example.

Take a hash algorithm, MD5[8] or SHA-1[9]. Hash algorithm has become a digital digest, and the digital fingerprint is a kind of one-way irreversible function[10]. Then take arbitrary length to set the random code a of m length, via a hash function f, and next with the fixed length n, the hash value b: b = f (a) is obtained through calculation. Then make a and b level connected to anti-piracy code a||b whose length is (m + n), and finally the anti-piracy authentication code a||b will be hidden in book printing and packaging. The information of the anti-piracy authentication code has the following characteristics:

The anti-counterfeiting authentication code a||b consists of two parts, the authentication code a is an unpredictable random number with an arbitrary length; authentication code b is a hash value produced by the hash function, and it has a fixed length.

Anti-piracy authentication code hides itself within the goods in the form of disposable packaging.

2.2 The authentication of anti-counterfeiting codes

Anti-piracy authentication system provides the anti-piracy authentication code with query interface to network communication tools, which facilitates different end rights-interests holders to verify the anti-piracy authentication codes for the legal copy and pirated copy.

During authentication of anti-piracy authentication code, the authentication system separates the received codes according to their length and get a and b. The hash relationship is first verified, if b = f (a), the anti-piracy authentication code is a real one; otherwise, a false code, and thus the book is pirated; second, according to the codes 'queried number of times in the authentication system, and combining the fact whether it is the first verification, the codes and books are legal or pirated can be determined. Specific progress is shown as follows.

Through disposable packaging, the end users obtain the anti-piracy authentication code x, and send the anti-piracy codes to the authentication system through telecommunications network by query methods such as telephone, mobile phone or network, and then the authentication system first divides x into two parts: a||b according to the length of the function f's output value of to verify whether b and f (a) are equal. If equal, the anti-piracy authentication code is real, and needs further inspection; otherwise, the code is false, and the book is pirated. The system would feed back with the information "No book is published corresponding to the code, and the book is pirated". If b = f (a), the authentication system will query a||b , if the code is not recorded in the database, then it illustrates that the code is queried for the first time, and the system will feed back with the information "The anti-piracy authentication code is authenticated for the first time, and the book is the legal copy". Meanwhile, the authentication system will record the anti-counterfeiting code, and set its "authentication number" at 1. If the anti-piracy authentication code has existed in authentication system database and its "authentication number n" is greater than or equal to 1, the system will warn the inquirers to confirm whether the anti-piracy authentication code is obtained through damage of the disposable packaging: "The anti-piracy authentication code has been authenticated for n times; if this is your first time (after damaging the packing) to query, then the book is pirated". Then the authentication system will add 1 to the "authentication number n", and issue a warning to the administrator of the authentication system.

The anti-piracy method realized by the anti-piracy authentication codes features low cost, being easy to be realized, and good anti-counterfeiting effect, can be widely used in the copyright protection area such as books, phonotype and videotape.

3. Conclusion

This paper presents a method to prevent pirated books and prevent piracy, and provides buyers with an independent and easy identification method in the process of books circulation, which can effectively crack down on the pirates' batch production behavior, curb their economic interests, effectively crack down on piracy, protect the interests of copyright owners, solve the existing batch piracy of books as well as meet the buyers' actual demand of easy identification and independent authentication in application.

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