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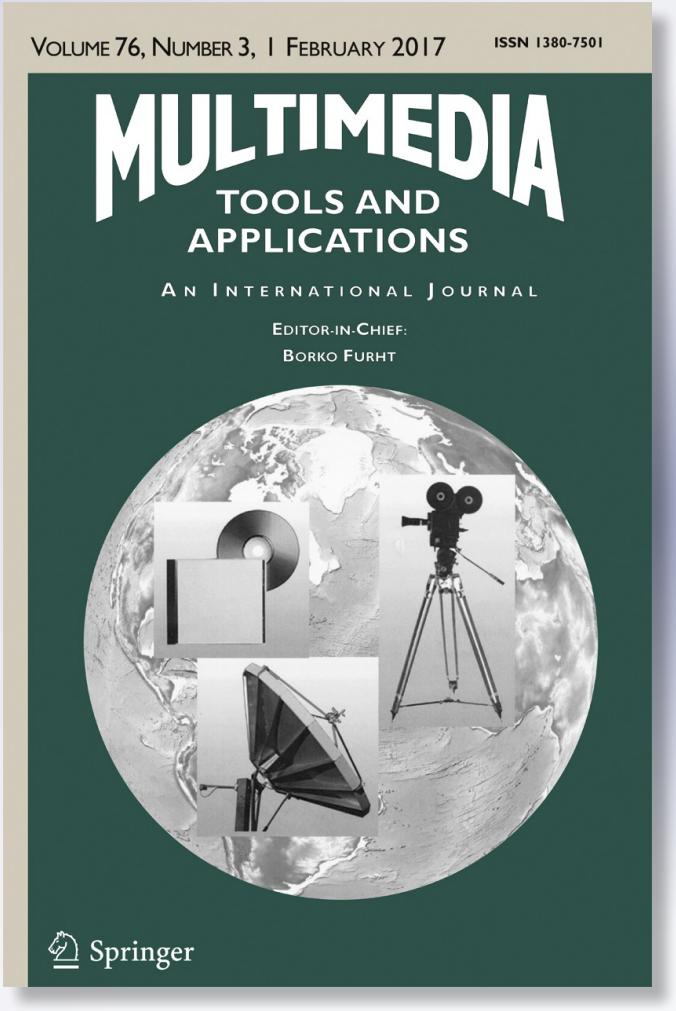

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GUEST EDITORIAL

Guest Editorial: Multimedia Social Network Security and Applications

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In the increasingly inter-connected society, multimedia social networks (MSN) have become a 'mainstream' tool used by online users to connect and share contents with other users 24/7 in real-time. It is, therefore, unsurprising that MSNs have become a salient area of inquiry by computer scientists and computer security researchers. For example, researchers need to design intelligent computing and soft computing technologies to improve multimedia system functions, efficiency and performance, as well as improving user's sharing experiences (e.g. using recommendation systems and more effective algorithms). Ensuring the security of users and data are also an ongoing topic of interest and importance due to the ease in producing and sharing user and multimedia content using MSNs. In recent years, we have seen advances in multimedia system security and soft computing for MSN applications, such as "hard" security mechanisms (e.g. protocols and methodologies) and "soft" computing methods (e.g. machine learning and rough set), as well as research efforts in trust assessment, risk management and social factors to understand the trade-off between the effectiveness and security in MSNs.

This special issue is dedicated to the reporting of state-of-the-art and recent advancements in this emerging area of enquiry. We received 26 submissions for this special issue, of which 12 were accepted for publication (i.e. 46 % acceptance rate). Each paper went through a rigorous peer review process, in addition to multiple follow-up rounds with the authors. A summary of the papers is categorized and presented below.

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1 Social networks

Due to the pervasiveness of social networks, the capability to measure and quantify the influence of users (e.g. influential users) has many applications, such as targeted marketing and advertising (e.g. pay influential users to advertise a particular product, in order to maximize exposure). Some studies on social network trust model and credential paths finding algorithms were done [24–26]. In this special issue, Zhuang et al. [27] presented a way of measuring the spread influence of users in microblog. In their approach, the authors considered user interaction features, retweet intervals, location of users in information cascades and other features relevant to the measurements.

While it is important to measure and quantify the influence of users, it is equally important for e-commerce businesses and review website providers to be able to identify and remove deceptive review spam (e.g. written by competing businesses or disgruntled employees). This is the area that Rout et al. [17] seek to contribute to in this special issue. Specifically, the authors demonstrated how the collective use of supervised and unsupervised techniques as well as sentiment analysis can be used to identify such review spam.

Identifying and removing compromised social networking accounts is a key solution to addressing disseminating of review spams and other spams, as well as malicious content. In this special issue, Barbon et al. [6] demonstrated that text mining approach of the posts' content can be used to determine whether an account has been compromised. The approach consisted of extracting the user's writing style, uses the k-Nearest Neighbors algorithm (k-NN) to evaluate the post content and identify the user, and uses a continuous updating of the user baseline to support existing trends and seasonality issues of the user's posts. The findings reported by the authors in this special issue, as well as those of Peng et al. [14]) and Peng et al. [15]) demonstrated the potential to identify users based on the textual contents of their postings on social media.

Niu et al. [13] also noted the inevitable fact that we will have malicious nodes or nodes with malicious intent or behaviour in any (mobile) social networks, where these nodes seek to disrupt the normal functioning of the networks (e.g. discarding and tampering network packets). Therefore, it is important to ensure the resilience of such networks by having a sufficiently robust service recovery mechanism. In this special issue, the authors present a service recovery method based on trust evaluation, which adopts the Dempster-Shafer (D-S) evidence theory.

2 Cryptographic solutions

For decades, Digital rights management has been still a burning issue [22]. The use of encryption is generally recognized as an effective tool in ensuring the confidentiality of data-at-rest and data-in-transit. In this special issue, Peng et al. [15]) present a selective encryption scheme designed to ensure the confidentiality of H.264/AVC video in multimedia social networks.

However, there are limitations in encryption-based solutions. For example when one wishes to share data such as multimedia content with different groups of users whose access rights may dynamically change. Therefore, to provide the scalability and flexibility of real-time multimedia data sharing, the fine-grained access control such as using delegation and secure sharing approaches are required (see [7, 18, 20, 25]).

Wang et al. [19] in this special issue present a social network delegation model, which allows delegators in the MSN to provide their delegation policies. The model, formalized using a behaviour sequence logic language, will attempt to resolve delegation conflicts, if any. The authors then evaluate their approach using a custom-built multimedia social network.

3 Forensics

Digital forensics, including multimedia forensics, is an increasingly important research focus due to the digitalization of our society [1, 9, 16]. This is also evidenced by the work of Yang et al. [21], and Azfar et al. [3] in this special issue.

Yang et al. [21] present an AVI carving technique to recover a fragmented video file using the frame size information in every frame and the index. They demonstrate the utility of their technique using a prototype on 16 camera shot AVI files.

Azfar et al. [3] extend their previous work [2, 4, 5] to 30 popular Android productivity apps. Based on the findings of the forensic examination of these apps, a two-dimensional taxonomy of the forensic artefacts of the productivity apps is presented.

4 Watermarking and data hiding

Unlike some of the topics examined in this issue (e.g. social networks and mobile apps), watermarking and data hiding have been extensively studied but there are still worthwhile contributions to be made in this area [12].

In this special issue, for example, Jeyhoon et al. [10] propose a blind audio watermarking algorithm which can be used to embed data as well as extracting the embedded data by changing the Discrete Cosine Transform (DCT) coefficients. Niu et al. [13] also present an image watermarking scheme designed to be resilient again desynchronization attacks, particularly for colour images. In their approach, the authors extract the steady colour image feature points using a new image feature point detector, based on the colour invariance model and the probability density. Then, the authors build the affine invariant local feature regions using a probability density, prior to using their watermarking algorithm to embed the digital watermark into the affine invariant local feature regions.

Lu et al. [11] studied the combination use of asymmetric-histogram shifting method with the gradient adjusted gap, median edge detect, and interpolation by neighboring pixel to generate prediction errors, in their attempts to embed secret data in images. The authors demonstrated that different methods have varying performance outcome on the types of images (e.g. complex images or images with smooth edges).

5 Mobile apps

Due to the increasingly popularity of mobile apps, they are the subject of ongoing research efforts, including mobile recommendation systems via apps examined by Hsieh et al. [8] in this special issue. The authors presented a collaborative filtering-based mobile app recommender system, which is designed to suggest movies to the users. In addition, the system collects data related to the movies from external open web APIs, and uses cluster-based matrix factorization

to capture the shared preferences between user clusters and apps clusters, and the relationship between (categorized) App and movie based on the number of the overlapping features.

6 Future research directions

Despite the significant amount of published research attempting to address the wide range of multimedia social network security and application issues (e.g. in this special issue), there are a number of challenges that remain to be addressed, including social media platform security and trustworthiness measurement and evaluation by the new computing paradigm of crowd computing [23], as well as risk management and social-factor considerations in multimedia social network applications, etc.

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