

## Editorial

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Dear Colleague:

Welcome to volume 28(3) of the Intelligent Data Analysis (IDA) Journal.

Dear reader, welcome to this third issue of our 28<sup>th</sup> year of the IDA journal. In this issue, we have selected papers covering different theoretical and applied topics in the field of Intelligent Data Analysis.

The first half of the issue covers mostly theoretical contributions in both algorithms and methodologies, whilst the second part is devoted to several interesting applications in a wide range of areas.

We begin the first part with an initial group of contributions, including image analysis in multilabel and image-text matching scenarios. First, Huang et al. present CMSG, a novel cross-modality semantic guidance-based framework for multilabel image classification. This framework combines a semantic-guided attention module, providing a correlation matrix between labels to guide the learning of class-specific features, with a spatial-aware attention module to extract high-level semantic-aware spatial features based on class-specific features obtained from the previous semantic-guided attention module. The result is a new method that outperforms existing state-of-the-art algorithms on multilabel image classification. A second paper on extended image data analysis is presented by Hao et al. This paper explores the local semantic relationship between the images and the sentence introducing the image. In this contribution, the authors propose a hierarchically joint embedding model to incorporate the local semantic relationship into a joint embedding learning framework. The proposed method learns the shared local and global embedding spaces simultaneously and models the joint local embedding space with respect to specific local similarity labels, which are easy to access from the lexical information of corpus.

The next group of papers include new methods for adaptive and active learning. Tiang & Zhang introduce us to BADA (Boosting Active Domain Adaptation with Exploration of Samples), an active domain adaptation method that divides the task into sample selection and sample utilization. The authors design the instability selection criterion based on predictive consistency and the diversity selection criterion, and for the remaining unlabeled samples, they propose a self-training framework, which screens out reliable samples and unreliable samples through the sample screening mechanism similar to the selection criteria. A second paper in this group is the one authored by Xu et al. In this paper, the authors introduce a new multi-domain adaptive neural machine translation method, addressing the problem of imbalanced data generally caused by simple fine-tuning. This method applies Domain Data Balancer (DDB) to the transform model to adaptively learn the sampling distribution of each group of training data, replacing the maximum likelihood estimation criterion with empirical risk minimization training. The method also uses a reward-based iterative update of the bilevel optimizer based on reinforcement learning to improve the machine translation performance.

The following group of paper include data extraction and transformation. First, Johnson & Giraud-Carrier propose a graph transformation approach for efficient classification in chaotic human systems that combines game theoretic, network theoretic, and chaos theoretic principles. The proposed approach compiles graph structural properties into time series that are then transposed into the frequency domain to offer a dynamic view of the system for classification. The paper also includes a series of benchmark datasets in which agents compete and cooperate, such as social media networks, stock markets, political

campaigns, legislation, and geopolitical events. The second paper in this group is signed by Dai et al. and addresses the problem of event extraction in natural language processing tasks, particularly overlapping event extraction. The authors propose a new cascade decoding model, the Joint Learning Framework for Cascade Decoding with Multi-Feature Fusion and Conditional Enhancement for Overlapping Event Extraction. This model combines a cascade decoding mechanism with multi-feature fusion for better capturing the interaction between decoding layers, and an enhanced conditional layer normalization mechanism to enhance the interaction between subtasks. The proposed model is tested in three subtasks, type detection, trigger word extraction and argument extraction.

This theoretical part concludes with a third group of papers on recommendation systems. Zhang et al. present an interesting paper on the topic of conversational recommender systems. The paper proposes a sparse multi-hop conversational recommender model named SMCR. This new method deals with the size and noise of the knowledge graph involved in the dialogue context, which restricts the primary node's aggregation to neighbor nodes. The fundamentals of the method is a multi-hop attention network to encode dialogue context, which also uses a variational auto-encoder to learn topic information for capturing syntactic dependencies. As a result, the proposed method accurately identifies important edges through matching items, reducing the computational complexity of sparse graphs. The second paper of this group is presented by Tang et al. In this contribution, a new model called FLSIE, Feature-aware Long-Short Interest Evolution Network, is introduced. The proposed method aims to solve the problem of dealing with users' long- and short-term interests in an integrated manner. This model uses explicit feature embedding to represent item-attribute information and employs a two-dimensional attention mechanism to distinguish the significance of individual features in a specific item and the relevance of each item in the interaction sequence.

We start the second part with three papers on medical applications. In Zhang et al., the authors present a deep learning approach to predicting Alzheimer's disease (AD) progression focused on the explainability and trustworthiness of the prediction. The authors leverage the potential of an attention-aware evidential recurrent network to introduce temporal attention into an evidential recurrent network, which improves predictive performance and reliability for trustworthy AD progression prediction. A second paper on medical applications is the one introduced by Fang and Cao, addressing the problem of medical image registration, a fundamental and critical task in medical image analysis. This paper presents a pure convolutional neural network module to implement hierarchical transformers and enhance the registration performance of these medical images in combination with a spatial interaction attention module to compute the interrelationship between the target feature pixel points and all other points in the feature map. A third paper on medical applications is Jiang and Qiao's on skin lesion segmentation. The article presents ACEANet, a new network based on an encoder-decoder architecture, which can accurately and reliably segment various skin lesions. The method's core is founded on an Ambiguous Context Enhanced Attention module that augments the ambiguous boundary information. Additionally, a Dilated Gated Fusion block is also employed at the end of the encoding phase, which effectively reduces the loss of spatial location information due to continuous down-sampling in combination with a novel Cascading Global Context Attention to fuse feature information generated by the encoder with features generated by the decoder of the corresponding layer.

We continue with the application papers with Zhang et al., who present a new code search method that optimizes intra-modal and inter-modal representation learning. The rationale behind their approach relies on the alignment of programming and natural languages, claiming that existing approaches using pre-train models for code search do not effectively consider implicit alignments.

Wu et al. propose another application paper, in which the authors present a new method based on Generative Adversarial Networks for generating magazine layouts constrained to text, graph and user design

considerations. The proposed method generates high-quality layouts based on these input constraints and can handle complex formatting and design requirements.

We conclude this issue with the paper by Belbekri et al. in which the authors present new training dataset called Social-NER2.0 that addresses the situations in which quality and quantity of labeled data is available. The authors also propose a construction process involving data selection, extraction, enrichment, conversion, and balancing steps to pre-train BERT model to improve the performance in Named Entity Recognition tasks.

With our best wishes,

*Dr. A. Famili*    *Dr. J.M. Peña*  
*Founder*        *Editor-in-Chief*