



# Multimedia Tools and Applications

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## Low-resource Media Computing in the Big Data Era

### 1. Introduction

We are currently embracing the big data era. With the help of supercomputing infrastructure and large scale machine learning techniques, the explosion of huge amount of text, audio and visual data has dramatically lifted the performance of various media computing tasks, e.g., speech recognition and computer vision, to a new level that never has been reached before. However, in the thrilling big data era, there are still a lot of real world tasks that are *low-resourced* by nature in different aspects, e.g., raw data, labels and even knowledge and human expertise. We can roughly categorize low-resource (or sometimes called under-resource, zero-resource) tasks as follows:

- 1) **Big raw data but with no or limited labels:** Whereas current most machine learning-based classification tasks require training on thousands of samples and very large datasets, there are still many applications that have to learn information about classes from one, or only a few, training examples. This is because labeling large data requires extraordinary or prohibitive effort. Sometimes the learning technique for this scenario is called one-shot learning.
- 2) **Big raw data but no labels for a new class:** The ability to classify instances of an unseen class is useful in many situations. For example, in the big data era, there are many species, products or activities without labeled data and new categories, such as the latest gadgets, new words, are introduced frequently; specifically, for instance in computer vision, without ever seeing a cat image, the ability to extend or extrapolate from what is known to making a measured, intelligent guess is desirable. This in the literature is often referred to as zero-shot learning.
- 3) **Limited data, no labels, limited knowledge and rare human expertise:** In some real-world scenarios, data is limited with no labels and even we do not know much about the data themselves. Take speech recognition as an example. With the help of huge amount of labeled data and (deep) machine learning, we saw tremendous success in improving speech recognizers for languages such as English and Chinese. However, with close to 7000 languages in the world, the most important challenge today is to port speech processing systems to new languages rapidly and at reasonable costs. Major bottlenecks are the sparseness of speech and text data and the lack of language conventions and expertise.

Recently, we have been witnessing increasing efforts in handling the

aforementioned low resource problems using advanced technologies like neural networks and nonparametric learning methods. Specifically, neural networks have emergingly shown their advantages in solving real-world low-resource media computing problems via strategies like one-shot or zero-shot learning, multi-tasking learning and transfer learning. Therefore, this special issue seeks to bring together contributions from researchers and practitioners in the area with an emphasis on new thoughts and methods in low-resource media computing.

## 2. Topics

We solicit high-quality original research papers and overview papers on topics including, but not limited to:

- Neural network and non-parametric approaches for low resource media computing problems
- New thoughts on conventional learning strategies, e.g., model adaptation, one-shot or zero-shot learning, multi-tasking learning and transfer learning and brand new learning strategies
- Novel methods for handling low resource media from various types, e.g., texts images, videos, audios and human speech
- New applications and tools that facilitate low-resource media computing
- New problems and future trends regarding low-resource media computing in the big data era

## 3. Schedule

### **Submissions due: August 31, 2016**

Notification of the first round review: October 31, 2016

Final acceptance notification: December 31 2016

Final manuscript due: January 31, 2017

Publication date: Summer 2017 (Tentative)

## 4. Submission Guidelines

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Prospective authors should strictly follow the author guideline (<http://www.springer.com/computer/information+systems/journal/11042>) for the preparation of submissions. Submitted papers will go through a strict peer review procedure. A separate cover letter, that provides a clear summary of authors and the article, is required when making the submission. All the papers should be submitted to online submission system at <http://mtap.editorialmanager.com> and by choosing the Article Type: “Sp Iss: Low-resource Media Computing in the Big Data Era.”

## 5. Guest Editors

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