Natasa Sofou

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Abstract:
Title: Active human in the loop deep learning for cultural heritage metadata enrichment.

In the presented work, we are concerned with the problem of metadata enrichment in digital cultural content, in particular, we investigate the case of music-audio data labeling in Europeana Music collection. Our approach originates from the branch of Artificial Intelligence (AI) and active learning, known as human-in-the-loop (HITL) and leverages both human and machine intelligence to develop innovative AI systems that enhance audio metadata, e.g. extracting the type of musical instruments heard of a music piece. Methodologically, we first construct a labeled training dataset of musical pieces containing a predefined set of MIMO musical instruments, which is then used to train a deep neural network based on the very successful Convolutional Neural Net (CNN) architecture. The trained CNN model is tested against Europeana Music collection dataset, aiming to automatically label the relevant data based on MIMO musical instruments. Along with each label, the model also assigns a confidence score, corresponding to how sure the algorithm is that it's making the right classification. For some of the data labeled with confidence scores below a certain value, human judgment is requested and in turn obtained through crowdsourcing campaigns. The newly obtained human annotations are used both for metadata enrichment and also fed back into the machine learning model to enhance its accuracy. In other words, when the machine isn't sure what the answer is, it relies on a human, then adds that human judgment

to its model. The presented model is generic and can be adapted to deal with visual data by altering the training datasets and adjusting the deep architecture and the learning process.

Bio:
Dr. Natasa Sofou is a senior researcher at Intelligent Systems, Content & Interaction Lab in NTUA. She is a graduate of Department of Informatics and Telecommunications of National and Kapodistrian University of Athens. She received her MSc: "Advanced Computing" from Computer Science Department, University of Bristol, UK, and her Ph.D. in Morphological Image Segmentation from School of Electrical and Computer Engineering, NTUA. Her research interests lie in the areas of Image Analysis, Computer Vision, Machine Learning and Artificial Intelligence. She has participated in numerous FP7, e-ContentPlus and Europeana related projects. She is currently active in the area of cultural heritage, experimenting with machine learning and deep neural nets trying to identify how AI can assist the promotion of digital cultural heritage through new technologies and methods that enable user engagement and richer cultural experiences.