Course: Brain Inspired AI
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Paper: SoundNet: Learning Sound Representations from Unlabeled Video

In this paper, large amount of unlabeled natural sound data was used to train a sound-representation model. The natural synchronization between vision and sound was achieved using two-million unlabeled videos from the wild. The advantage with unlabeled data is that it can be gathered in large amounts, economically. It also contains raw information that can be further explored. In this paper, a student-teacher method was used to transfer visual knowledge from visual models into sound via the abovementioned unlabeled videos. This method (sound representation) showed better performance than the current acoustic classification methods through higher level semantics. To be more specific, deep sound networks (SoundNet) were trained by transferring the knowledge from visual networks and unlabeled videos, aka, a combination of sound and vision. This inherent combination of sound and vision in videos helped to make a bridge between them in order to have a better acoustic representation. The results showed that by downloading more video data, implementing deeper and more complex neural networks, and using better vision models, the performance of the system increases.

Paper: Deep neural network models of sensory systems: windows onto the role of task constraints

sensory systems are the models that predict and evaluate the neural responses and behaviors. Before, artificial intelligence (AI) was used for neural computations and models. But nowadays, the aim is to use such methods to perform human-level tasks and predictions. Deep learning methods are well able to represent the brain and its functionalities. In this paper, the applications and impediments of deep learning networks and sensory systems is discussed. Particularly, the paper shows how optimized networks can relate to the traditional models. First, some history and recent progress in different deep learning models is mentioned. Then, it talks about how deep learning is used to predict the behavioral and neural responses of the brain. Finally, it talks about how deep learning is used to reveal tasks constraining neural systems and behavior and the possible limitations.