

CS365 : Artificial Intelligence

PROJECT PROPOSAL

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“Human Action Recognition Using Neural Networks”

Motivation:

Human action recognition is an active area of research in the field of Computer Science. This has been motivated by the need for fast video indexing application and reliable automated video surveillance systems. Current methods for human action recognition mainly use texture descriptors and image processing. Despite their high performance, these methods are highly problem dependent. In this project, we look at this problem using neural networks which automatically build high level representation of raw input without any pre-processing.

Description:

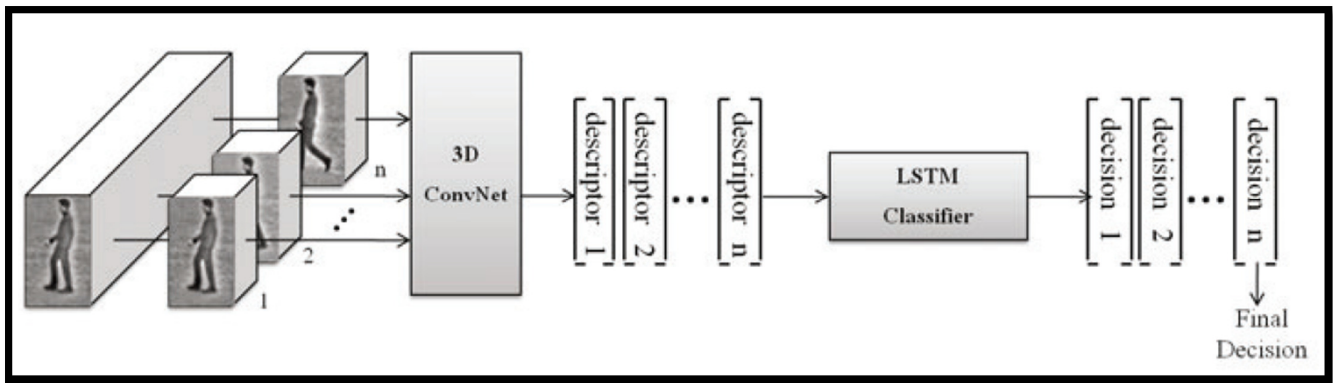
We propose to implement human action recognition in video streams through neural networks. The problem we would be addressing is to classify the KTH human action dataset into different categories using Convolutional (CNN) and LSTM (Long Short-term Memory) Recurrent neural networks.

Project Approach:

We propose to do the project in three sub-parts:

- Converting input video streams to set of frames, then applying image sampling and dimensionality reduction on each frame. (Refer paper[1])
- Feature extraction and sub-sampling of 3D input using Convolutional Neural Network, where third axis is the time-frame axis. (Refer paper[1], paper[2])
- Using LSTM Recurrent Neural Network as action classifier for the outputs of CNN. (Refer paper[1],paper[3])

In our project, we would be mainly focussing on paper [1]. This paper completely implements action recognition using different neural network approaches and is very recent (published in Nov. 2011). It includes efficient techniques for implementing mathematical models.



CREDIT: “Sequential Deep Learning for Human Action Recognition” Paper by: Baccouche, M., Mamalet, F., Wolf, C., Garcia, C., Baskurt, A. [2011]

Dataset Referenced:

We would be using KTH Human action database, refer:

<http://www.nada.kth.se/cvap/actions/>

Papers Referenced:

[1] Baccouche, M., Mamalet, F., Wolf, C., Garcia, C., Baskurt, A. : “Sequential Deep Learning for Human Action Recognition” . In: Salah, A.A., Lepri, B. (eds.) HBU 2011. LNCS, vol. 7065, pp. 29–39. Springer, Heidelberg [2011].

[2] Lawrence S., Giles C. L., Tsoi A. C., & Back A. D. “Face recognition: A convolutional neural-network approach.” *IEEE Trans. Neural Netw.* 8, 98–113. [1997]

[3] Baccouche, M., Mamalet, F., Wolf, C., Garcia, C., Baskurt, A. “Action Classification in Soccer Videos with Long Short-Term Memory Recurrent Neural Networks.” In: Diamantaras, K., Duch, W., Iliadis, L.S. (eds.) ICANN 2010. LNCS, vol. 6353, pp. 154–159. Springer, Heidelberg [2010]