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CSCE823 – Dr. Borghetti

Pre-Class and Learning Activity

Topic Overview:

Temporal Convolutional Networks (TCNs) use the advantages of convolutional neural networks to efficiently evaluate large, time-series data sets. The advantages of TCN when compared to alternatives are smaller memory requirements and faster computation. TCN really shines when used with natural language processing and other tasks with large data sets that require a focus on local, temporally adjacent observations. This benefit can also be used by layering a TCN before other ML techniques, such as RNNs, in order to reduce the input size.

Objectives:

* Understand the pros/cons of Temporal Convolutional Networks
* Understand the difference between CNNs and TCNs
* Understand TCN use cases and requirements for input data

Lesson Plan:

Students should use the pre-class activities to get a general understanding of TCNs and a handful of use cases. The lecture, including in-class code review and discussion, should solidify the students knowledge of the concepts required to implement a TCN. The post-class activities will allow the student to practice implementing a TCN and experiment with different datasets that make effective use of TCN advantages.

Lecture Format:

The lecture will entail a PowerPoint presentation, a walkthrough of example code, and a question and answer based discussion. The lecture will go over the concepts that lend performance benefits to TCNs and are required knowledge to effectively implement one. This will tie-in to a walkthrough of an implementation of a TCN in Keras. The lecture will conclude with an open Q&A style discussion of the topics covered and python implementation.

Pre-Class:

1. Read:
   * <https://medium.com/@raushan2807/temporal-convolutional-networks-bfea16e6d7d2>
   * A summary of TCNs
2. Read:
   * Cholet section 6.4
   * Overview of concepts and implementation
3. Watch (just first 15min, rest optional):
   * <https://www.youtube.com/watch?v=nMkqWxMjWzg>
   * Example use of TCN

Post-Class:

1. Watch and complete code:
   * <https://www.youtube.com/watch?v=i390g8acZwk>
   * Coding exercise with accompanying lecture
2. Read and complete code:
   * <https://medium.com/the-artificial-impostor/notes-understanding-tensorflow-part-3-7f6633fcc7c7>
   * Follow-along coding exercise and article
3. Optional, supplemental reading:
   * <https://dida.do/blog/temporal-convolutional-networks-for-sequence-modeling>