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CSCE 221 Section 507

### “Deep Neural Networks for News Recommendations”

Discussed in the article is a system which utilizes neural networks in order to accurately choose and display content that falls in line with the preferences of the current user. The system has two models of recurrent neural networks that are designed to map specific user interests and provide recommendations during a visit. The first model is session-based and processes what the individual has looked at during the current viewing period. The second model is a history based version of the first that gathers a long term set of preferences. In order to accumulate the long term preferences a convolutional neural network is employed.

Recurrent neural networks are designed to make use of information that comes in sequences. Other networks may assume that all data is independent, while recurrent networks create links to data that came before the most recent input. This allows the system to develop accurate predictions. The predictions being outputted, are dependent on the tasks that are performed on the other elements in the sequence. These recurrent neural networks consist of several units. There are input units, output units, and a set of hidden units. To consistently create a desired output, the hidden units are given a pre-determined state. Each time there is a change in state each hidden unit sends its activity to its connections. Changes are then made to units based upon weighted values. Because each state change to the units exists on a timeline, a memory of previous occurrences can be used to create the desired output.

Convolutional neural networks are designed to go through data with a set of filters to recognize patterns. The network is given a training dataset. The dataset is analyzed and given output probabilities. Total error is calculated by comparing the output probability to the target of the training dataset. The points of data are then weighted and given parameters accordingly so that the system can more accurately classify info.

Personalization online is necessary due to the wide range of possible user interests. For personalization of news articles, the categories are grouped into structures. For instance, the category of sports can contain the more specific category of basketball. These categories are assigned to vectors and given weighted values, but not all articles are given two explicit categories. This is where the convolutional neural network does its job. The system predicts both the category and subcategory, and if the two are compatible it affects the user's preference profile. The preference profile displays the articles, and the cycle continues.

This system and many systems similar in concept to this one are revolutionizing the way consumers use the internet. Having content and goods curated on an individual basis will help with ease of use and accessibility across the entire internet. Sites that can do this well will surely gain more traffic and retention, and online retailers that are able to recommend items

will benefit from increased sales. Any website or service with large amounts of user accessible data would benefit from implementing systems like these.

Source:

Keunchan Park, Jisoo Lee, and Jaeho Choi. 2017. Deep Neural Networks for News Recommendations. (4 Pages) In Proceedings of the 2017 ACM on Conference on Information and Knowledge Management (CIKM '17). ACM, New York, NY, USA, 2255-2258.

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