ACL Paper Summary

Paper Chosen - TableFormer: Robust Transformer Modeling for Table-Text Encoding

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Semi-structured data (like variable-length tables without a fixed data schema) have become increasingly popular, especially in the age of the internet. These are often serialized with row/column information, simulating word sequences. However, these methodologies of linearization begin to incorporate extraneous row and column information biases. This means that altering the orders of rows or columns may result in models incorrectly predicting or returning values depending on the query. This poses an obvious problem when it comes to the integrity of data processing. Thus, a different method of tabular data storage was proposed, one that is invariant to the order of rows and columns. This proposed solution is TableFormer, which relies on 13 types of task-independent table/text attention biases that respect the table structure and table-text relations. It does not store row or column IDs, and instead has per cell positional IDs. Algorithms are run and re-run remove dependencies on inter-cell information (because that causes the prior row/column order bias issues). Rows and columns can be acknowledged with similar structuring for similar processing, but their ordering is not relevant.

All of the authors have other published works in the field of natural language processing, including “Diverse Top-K Decoding for Non-Autoregressive Semantic Parsing via Internet Conditioning” (Rahul Goel, Aditya Gupta, and Shachi Paul from this team), and “TimeDial:

Temporal Commonsense Reasoning in Dialog" (Aditya Gupta, Shyam Upadhyay, and Luheng He). The team is experienced in machine learning and its applications to natural language processing.

Since the paper is proposing a new methodology to storing and processing data, building on previous technologies (the Transformer architecture, BERT, TAPAS, etc.), its unique contribution is its new solution, the TableFormer structure. Beyond just proposing the idea, tests were also run to compare accuracy and validity. The paper is a fairly comprehensive description of the usefulness of TableFormer.

The authors evaluated their work by running tests on their TableFormer system and comparing results to existing models, to verify if TableFormer can overcome the problem of row/column biases. In the paper, tests were run in comparison with TAPAS on multiple datasets, before and after row/column perturbation. Results indeed showed that TableFormer performed much better after row/column perturbation compared to its contemporaries, confirming the proposition that TableFormer could be used to account for semi-structured data processing.

At the time of writing, according to Google Scholar, this article has 27 citations, being applied to projects such as "Table-to-text generation and pre-training with TabT5", "Table pretraining: A survey on model architectures, pretraining objectives, and downstream tasks", and "SUBS: Subtree Substitution for Compositional Semantic Parsing". Ultimately, it seems that TableFormer is a viable solution to row/column perturbation and can help with further studies on table-to-text information processing. It leaves the possibility of successors to build upon it as well, leading to even more accurate and efficient parsing of unordered datasets.