**Task and Dataset**

**Task:**
- Answering questions which contextualized by a scenario consisting of a textual passage and a set of tables.

**Challenges:**
- Properly manipulating tabular data to obtain deep-level tabular information.
- Reading comprehension with fusion of tabular data and textual information.

**Contributions:**
- GeoTSQA: the first dataset dedicated to TSQA, posing new research challenges.
- TTGen: extending machine reading comprehension methods with our table to text model TTGen to solve TSQA.

**Approach**

**TTGen: a table-to-text generator**
- Sentence generation: we use six table-to-text templates to encapsulate different powerful operations for synthesizing numeric tabular data.
- Sentence Ranking: we get a set of table sentences $S$ and only a subset of $S$ is useful for answering questions, we use K-BERT (Liu et al., 2020) for ranking.

**Machine reading comprehension with top-k $S$**
- $h_{\text{K-BERT}} = \text{K-BERT}(\text{question}, \text{option, domain knowledge}, \text{top-k } S)$
- The final of a candidate option is scored by $h_{\text{K-BERT}}$ with a multi-layer perceptron (MLP).

**Evaluation Design:**
- Experiments on GeoTSQA.
- We extend sota table-to-text method with MRC model.
- SOTA Table-to-Text Methods.
- Table-Infusing (Chen et al., 2020): encode table cells and then generate.
- GPT-L-Linearization (Chen et al., 2020): describe all cells of table and feed the GPT-2 with table passage to generate.
- Coarse-to-Fine (Chen et al., 2020): first generate template and then fill out template.
- Linearization: describe all cells of table into a passage.
- Templatization: concatenate all sentences of $S$ into a passage passage.

**Experiments**

**Error analysis:**
- Lack of external knowledge base (76%).
- Weak Reasoning Capabilities (62%).
- Sentence Ranking Error (54%).

**Conclusion:**
- We constructed the first TSQA dataset: GeoTSQA. We use six templates encapsulating predefined operations for synthesizing tabular data and then select the most useful sentences. At last, we use MRC model, fusing scenario passage, question, table information and domain knowledge to select answer.

**Resources:**
https://github.com/nju-websoft/TSQA