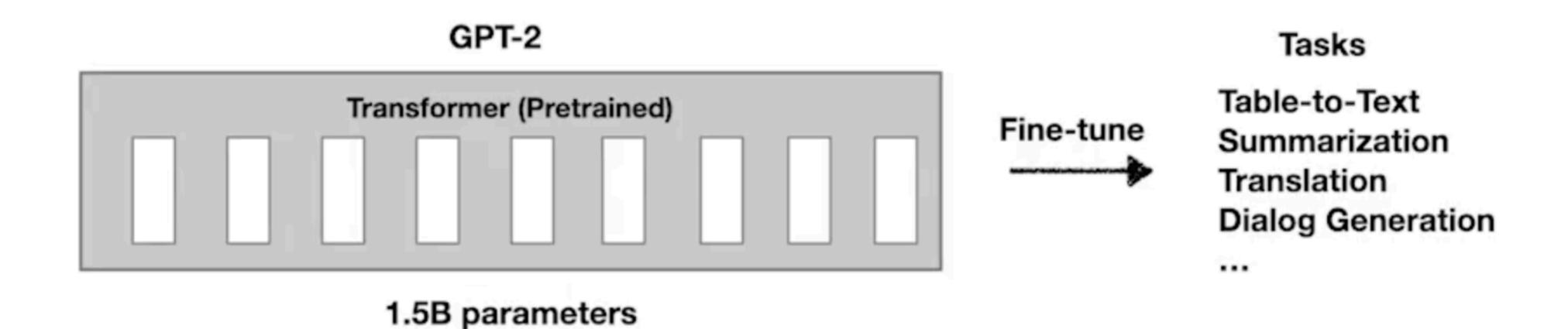
# Parameter Efficient Fine-Tuning

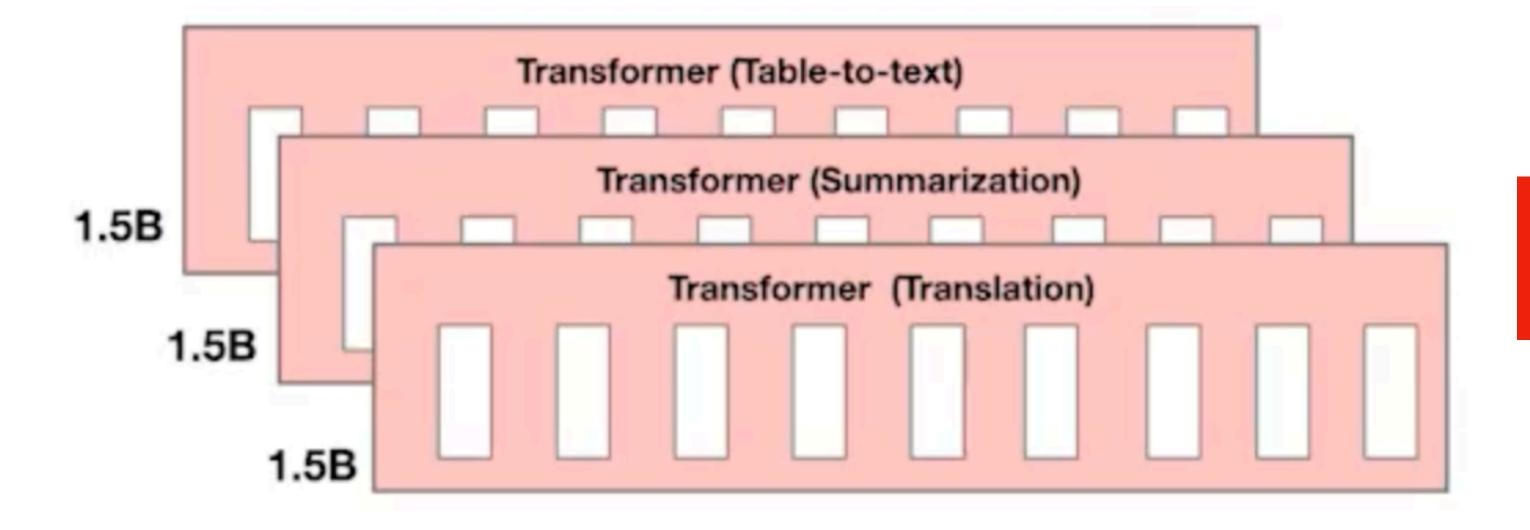
**Advanced NLP: Summer 2023** 

Li and Liang, ACL 2021

https://aclanthology.org/2021.acl-long.353

### Why not just use fine-tuning





Each task requires a full model copy

## In-context learning using prompts

Instruction

Example

Input

Summarize the following data table:

TABLE: name: Alimentum | area: city centre | family friendly: no A: There is a place in the city centre, Alimentum, that is not family-friendly.

TABLE: name: Starbucks | area: riverside | customer rating: 5 star



Output

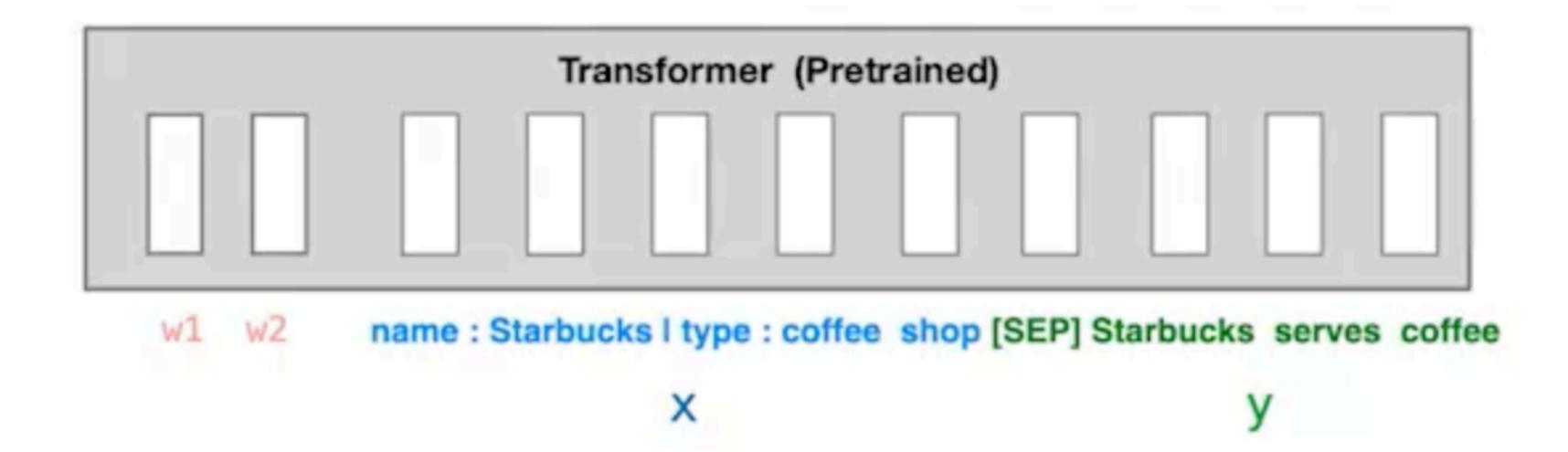
A: There is a place in the riverside, Starbucks, that has a 5-star customer rating.

- No task specific fine-tuning
- Preserves the LM

- Cannot use large training set
- Manual prompts can be suboptimal
- Cannot be used with smaller LMs like GPT-2

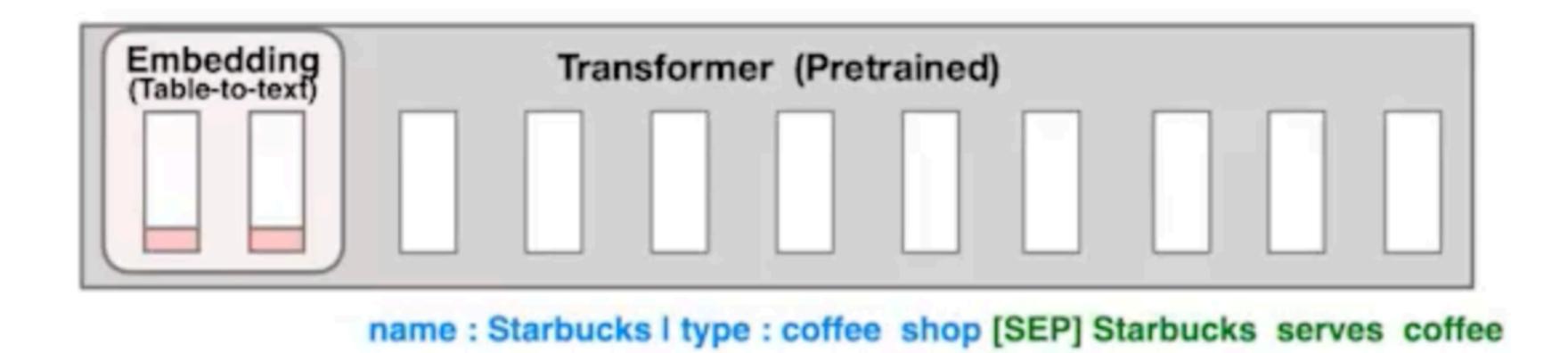
#### Intuition

- Learn a good instruction that can steer the LM to produce the right output
- Optimize finding actual words
- Involves discrete optimization which is challenging and not expressive



#### Intuition

- Optimize the instruction as continuous word embeddings
- More expressive
- Limits the scope of the prompt to a input embeddings



Х

#### Intuition

- Optimize the instruction as prefix activation for all layers in the instruction
- Very expressive
- All the layers of the prefix can be tuned to create the most expressive prompt

