Examining LLM's Awareness of the United Nations Sustainable Development Goals (SDGs)

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Motivation Example

Research has shown that **Black women** are left to struggle harder to access and advance in their professions

Masking Process

Research has shown that <MASK> are left to struggle harder to access and advance in their professions

Unmasking Process on each MLM

MLM_1
- Black women : 0.98
- men: 0.77
- he: 0.66

MLM_2
- men: 0.96
- Black women : 0.92
- he: 0.81

Examined LLMs

MLM	Mask Format	Source
bert-base-uncased[2]	[MASK]	Devlin et al.
distilroberta-base[3]	<mask>	Sanh et al.
xlm-roberta-base[4]	<mask>	Conneau et al.
xlm-roberta-large[5]	<mask>	Conneau et al.
bert-base-cased[6]	[MASK]	Devlin et al.
roberta-base[7]	<mask>	Liu et al.
roberta-large[8]	<mask>	Liu et al.
bert-large-uncased[9]	[MASK]	Devlin et al.

Evaluation Approach

$$Eval_{M^i} = \sum_{n=1}^{N}\sum_{k=1}^{K}\sum_{l=1}^{L}\mathcal{A}(\mathcal{S}_{k,l}^{n}, M^i)$$

Using public transport when **feasible** can be helpful in reducing **CO2** levels

Using public transport when **<MASK>** can be helpful in reducing CO2 levels

$$\mathcal{A}^P(.) = \frac{\sum_{m=1}^{||\mathcal{S}||}\widehat{P}(\mathcal{C}|\mathcal{S},\eta)}{||\mathcal{S}||}$$

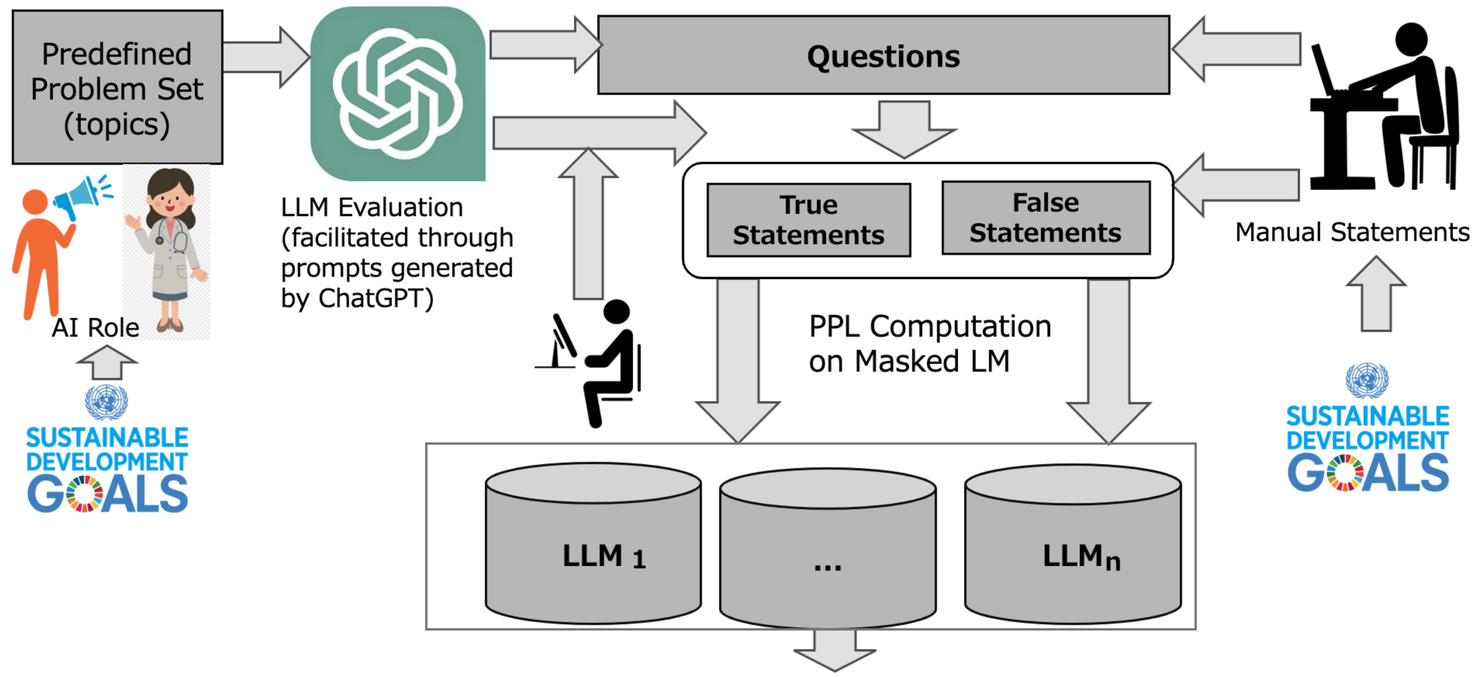
MLM

possible: 0.67
Capable:0.76

Feasible: 0.67 --> Rank 1
Infeasible: 0.55
Possible: 0.34
Impossible: 0.21

$$\mathcal{A}^R(.) = \frac{\sum_{m=1}^{||\mathcal{S}||}\widehat{R}(\mathcal{C}_m|\mathcal{S},\eta)}{||\mathcal{S}||}$$

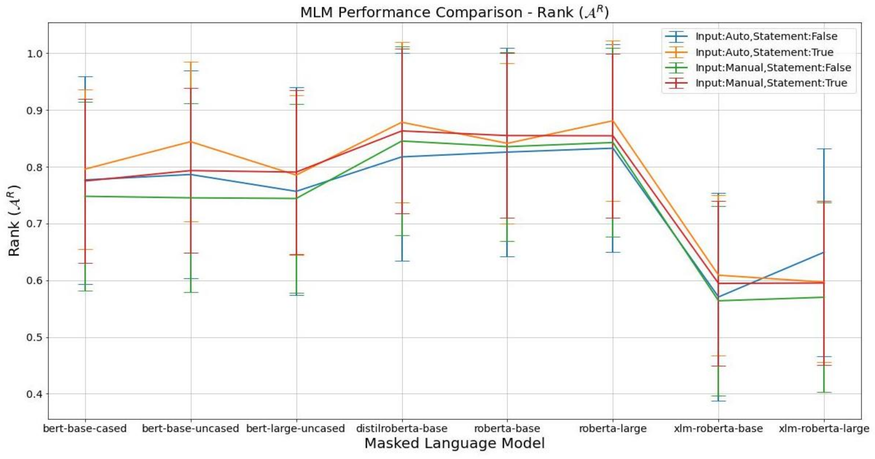
Proposed Approach

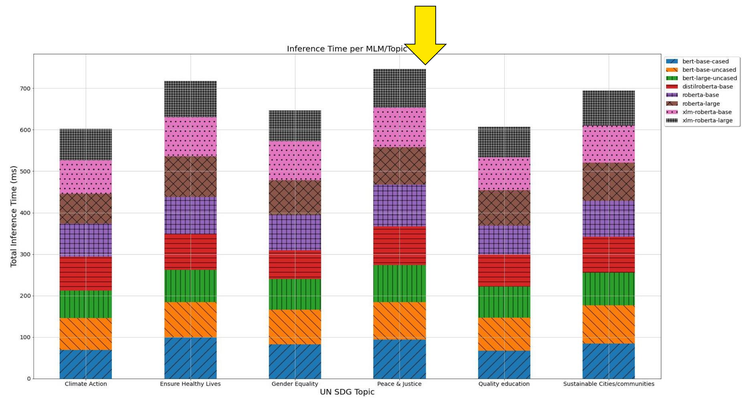


Evaluation Results

UN SDG Topic	Statement	Statement Type	Statement Input	Score	Rank
Ensure Healthy Lives	Healthcare systems should prioritize eco-friendliness when constructing new facilities	True	Auto (ChatGPT)	0.118	0.087
Sustainable Cities/communities	There should be no rules for buildings in cities	False	Manual (human written)	0.006	0.009

Two examples of Evaluated Statements





Inference Complexity

Auto/Manual Statement Evaluations on Masked Language Models with respect to True/False Statements; Evaluation based on Token Retrieval Rank

Dataset / GitHub / Paper