Overview of the NTCIR-18 FairWeb-2 Task

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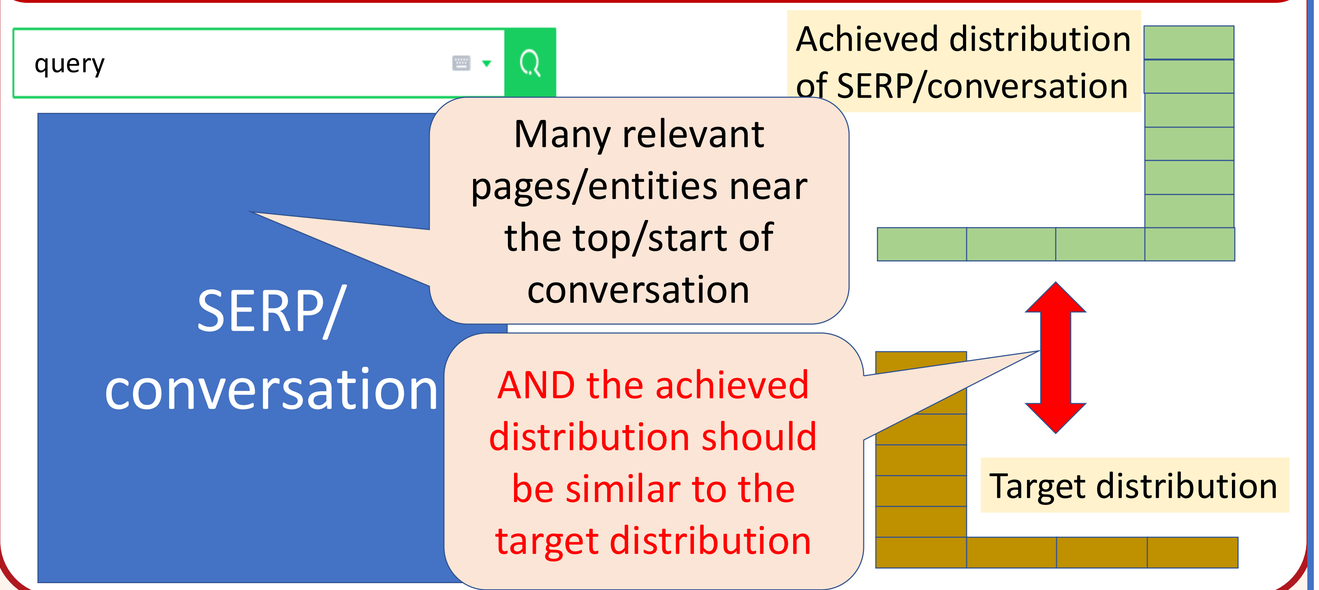
Web Search & Conversational Search that Consider Group Fairness



Task Specifications

INPUT:

- Search topics that describe information needs about entities
- Attribute sets and a target distribution for each of them

OUTPUT:

- **WS subtask:** runs contain relevant documents & group-fair wrt each attribute set
- **CS subtask:** plain-text user-system conversations contain relevant entities & group-fair wrt each attribute set

Topic/entity types and attribute sets: R, M, Y

Topic/entity type	Attribute sets
Researchers	HINDEX (ordinal, 4 groups) PRONOUN (nominal, 3 groups)
Movies	RATINGS (ordinal, 4 groups) ORIGIN (nominal, 8 groups)
Youtube contents	SUBSCS (ordinal, 4 groups)

Ex.“Rogue One” is a relevant **M** entity to an **M** topic “Star Wars Movies”

Test Collection Construction

Target Corpus (WS subtask): ChuWeb21D-60

- 49.8 million web pages and available online!

Topics:

- Organisers created 54 topics, 18 topics for each topic type

Submitted runs:

WS subtask

Team name	Institution	#runs
IITUH18	Indian Institute of Technology(BHU)	1
RSLFW	Waseda University	5
THUIR	Tsinghua University	6*
AMS42	University of Amsterdam	5
ORG	ORGANISERS	5
Total #runs		23

CS subtask

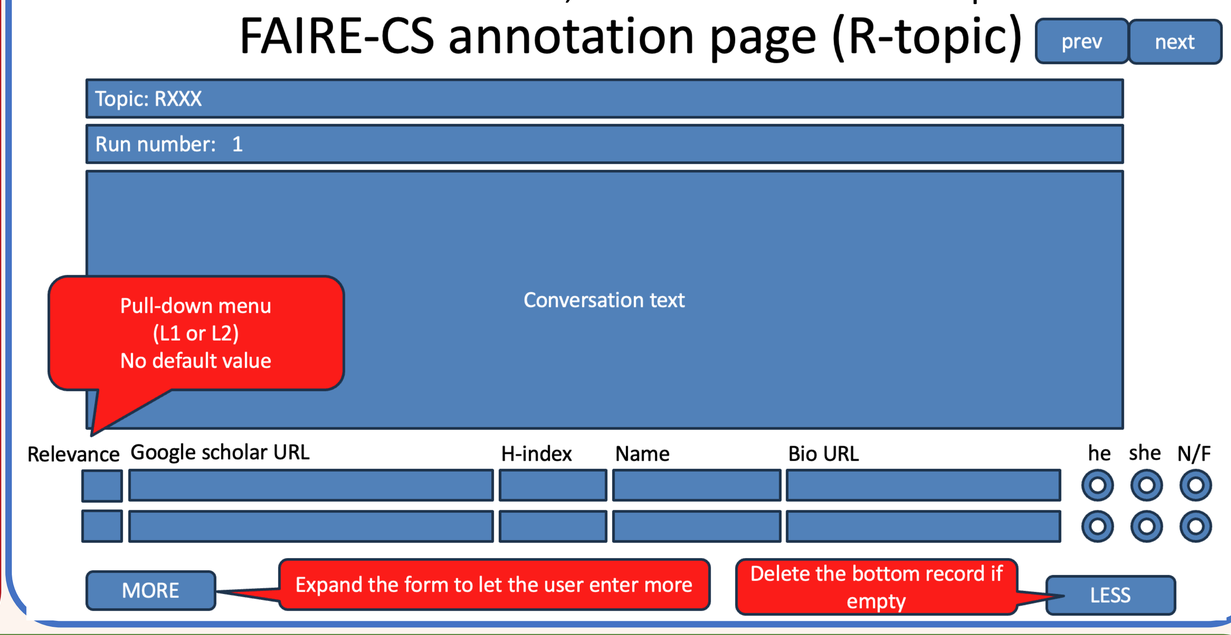
Team name	Institution	#runs
COPWA	Waseda University	3
ORG	ORGANISERS	1
Total #runs		4

*As the winner of Fairweb-1, THUIR submitted five runs and one additional REV run.

Entity annotation:

- Organisers served as gold assessors
- WS subtask: pooling depth = 25, max 3 relevant entities per document
- CS subtask: all runs annotated, max 10 relevant entities per conversation

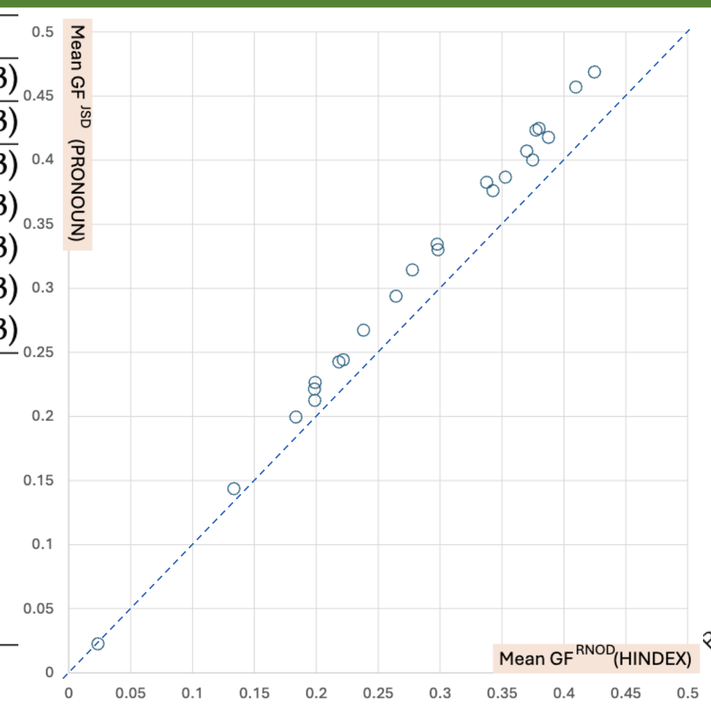
FAIRE-CS annotation page (R-topic)



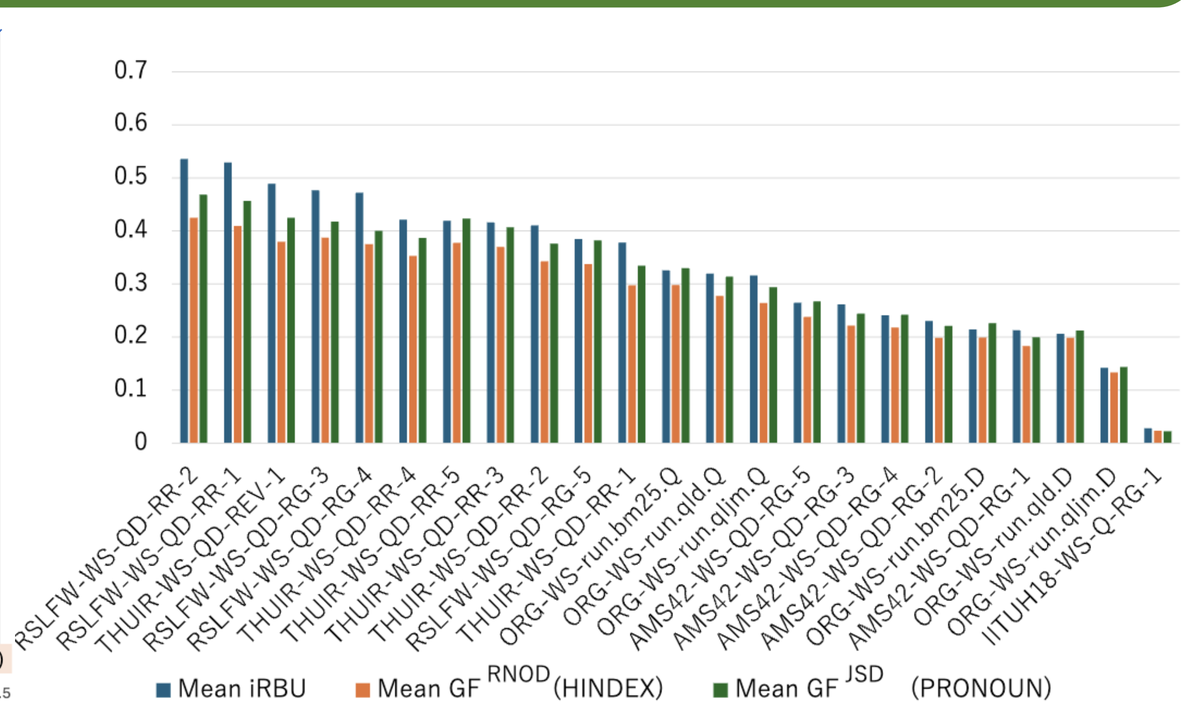
Official Results (R topics)

Rank	Run	Mean GFR
1	RSLFW-WS-QD-RR-2	0.4764 (>18-23)
2	RSLFW-WS-QD-RR-1	0.4651 (>20-23)
3	THUIR-WS-QD-REV-1	0.4314 (>22-23)
4	RSLFW-WS-QD-RG-3	0.4274 (>22-23)
5	RSLFW-WS-QD-RG-4	0.4157 (>22-23)
6	THUIR-WS-QD-RR-5	0.4067 (>22-23)
7	THUIR-WS-QD-RR-3	0.3978 (>22-23)
8	THUIR-WS-QD-RR-4	0.3868 (>23)
9	THUIR-WS-QD-RR-2	0.3765 (>23)
10	RSLFW-WS-QD-RG-5	0.3685 (>23)
11	THUIR-WS-QD-RR-1	0.3367 (>23)
12	ORG-WS-run.bm25.Q	0.3181 (>23)
13	ORG-WS-run.qld.Q	0.3039 (>23)
14	ORG-WS-run.qljm.Q	0.2914 (>23)
15	AMS42-WS-QD-RG-5	0.2568

Mean GFR score over the R topics (top 15 runs)



Intersectional group fairness: mean scores over the R topics



Mean scores over the R topics

Evaluation Measures

WS subtask: Group Fairness and Relevance (GFR)

$$GFR(L) = \sum_{k=1}^{|L|} Decay_{L@k} \left(w_0\, Utility_{L@k} + \sum_{m=1}^{M} w_m\, DistrSim^m_{L@k} \right)$$

How useful was the top k of the SERP: ERR/iRBU

Similarity between achieved distribution@k and target distribution

Probability that users will reach k and finally get satisfied

CS subtask: Group Fairness and Relevance of Conversation(GFRC)

$$\mathrm{GFR}(C) = \alpha R(C) + (1-\alpha) GF(C)$$

$$\mathrm{R}(C) = \frac{1}{\mathcal{N}} \sum_{i=1}^{T} \sum_{n_{ij} \in S_i} pw(n_{ij}) g(n_{ij})$$

Position-based weight of nugget n

Relevance score of nugget n (ERR at our task)

$$\mathrm{GF}(C) = \frac{1}{\mathcal{N}'} \sum_{i=1}^{T} PW(S_i) \sum_{m=1}^{M} w_m DistrSim^m(D^m(S_i) || D^m_*)$$

Position-based weight of turn S

Rank	Run	Mean GFRC
1	COPWA-CS-QD-MN-2	0.447591 (>2-4)
2	COPWA-CS-QD-MN-3	0.057489
3	ORG-CS-D-MN-1	0.032935
4	COPWA-CS-D-MN-1	0.000000

Run	Relevance
COPWA-CS-QD-MN-2	0.005664
ORG-CS-D-MN-1	0.000635
COPWA-CS-QD-MN-3	0.000515
COPWA-CS-D-MN-1	0.000000

Rank	Run	Mean GF^{JSD} (PRONOUN)
1	COPWA-CS-QD-MN-2	0.738476 (>2-4)
2	COPWA-CS-QD-MN-3	0.098337
3	ORG-CS-D-MN-1	0.061363
4	COPWA-CS-D-MN-1	0.000000

Rank	Run	Mean GF^{NMD} (HINDEX)
1	COPWA-CS-QD-MN-2	0.666162 (>2-4)
2	COPWA-CS-QD-MN-3	0.090909
3	ORG-CS-D-MN-1	0.045455
4	COPWA-CS-D-MN-1	0.000000

Mean GFRC, Relevance, and GF scores over the R topics

Conclusions and Future Work

WS subtask: **RSLFW** runs are the winners!
CS subtask: **COPWA-CS-QD-MN-2** is the winner!

What’s next?

- A new RAG task accepted at NTCIR-19! Stay tuned!
- R2C2 (RAG Responses: Confident and Correct?)