Overview of the JOKER Lab: Automatic Wordplay Analysis

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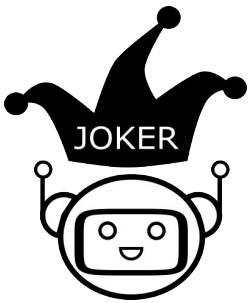

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JOKER Track Motivation

- Humor remains one of the most difficult aspects of intercultural communication & translation
- Wordplay is a common form of humor that can crop up in almost any type of discourse
- Perennial topic of scholarship in literary criticism, language education, and translation studies $\rightarrow$ need for specialized text retrieval and classification technology
- Important for opinion mining, conversational agents etc.
- Usual assumption: A word has a single meaning in a sentence, but wordplay exploits the confrontation of similar forms but different meanings
- AI requires quality and quantity of data for training and testing
- MT evaluation metrics measure the proportion of shared words

Top “easiest” punning words

EN	FR
Martians welcome. We have **space** for everyone.	Bienvenue les extraterrestres ! Installez vous, on a créé ces **espaces** détente pour vous.
A lot of trees were dying, but they needed to figure out the **root** of the problem.	De nombreux arbres mouraient mais personne ne trouvait la **racine** du mal qui les rongeait.
She was suspected of stealing a brooch but they couldn’t **pin** it on her.	Elle s’est fait **épingler** pour une histoire de broche volée.
Well drilling is a **deep** subject.	Le forage de puits est un sujet **profond**.
The inept mathematician couldn’t **count** on his friends.	Un mathématicien qui ne peut **compter** sur ses amis n’est pas un mathématicien...

Goals

- To provide appropriate reusable **data** and **benchmarks** for automatic wordplay analysis.
- To provide a discussion platform to address **technical & evaluation** challenges of automatic wordplay analysis
- **Use cases**:
  - Computer-Assisted Translation of wordplay
  - Corpus-based analysis of wordplay in the humanities
    - literary criticism
    - language education
    - translation studies
    - humor studies
  - Wordplay-aware Information Retrieval

JOKER@CLEF Shared Tasks

- Broken down into three tasks:
- Task 1: Detection of wordplay in English, French, and Spanish;
- Task 2: Location and interpretation of wordplay in English and French;
- Task 3: Translation of puns from English to French and Spanish.
- We also welcome runs within the unshared task with other, possibly novel, use cases, such as pun generation or humorousness evaluation.

Statistics on submitted runs by task

Team	Task 1: Detection			Task 2.1: Location			Task 2.2: Interpret.		Task 3: Translation		Total
	EN	FR	ES	EN	FR	ES	EN	FR	EN-FR	EN-ES	
Croland	1	1	1	1	1	1	1		1	1	9
LJGG	3	3	3						4	5	18
Les_miserables	3	3	3	3	3	3	1				19
MiCroGerk	6			6			4			7	23
Smroltra	7	7	7	4	4	4	6		6	6	51
TeamCAU	6			3					3		12
TheLangVerse	1								1	1	3
ThePunDetectives	6			5					2	2	15
UBO	1	1	1	1	1	1	1		3	3	13
UBO-RT							1	1			2
AKRaNLU	2	2	2	2	2	2	1	1			14
Innsbruck	3										3
NPalma	1		1							2	4
Total	40	17	18	25	11	11	15	2	20	27	186

Task 1: Wordplay Detection

- *Wordplay detection* is a binary classification task where the goal is to distinguish between texts containing an instance of wordplay and texts without it.

(1) When the church bought gas for their annual barbecue, proceeds went from the sacred to the **propane**. - *propane/profane*

(2) I used to be a banker but I lost **interest**. - *interest*

Task 1: Data & Evaluation

- Data
  - English (*)
    - Train: SemEval 2017, 2021
    - Test: Manually augmented data
  - French (*)
    - Manually and automatically translated puns from English
    - Manually augmented data
  - Spanish
    - Manually and automatically translated puns from English
    - Manually augmented data
- Evaluation measures:
  - Pun detection: P, R, F1, Acc
  - Pun location: Acc

** L.Ermakova, A.-G.Bosser, A.Jatowt, & T.Miller. The JOKER Corpus: English-French Parallel Data for Multilingual Wordplay Recognition. SIGIR '23*

Task 1 data statistics

	Train			Test		
Language	Positive	Negative	Total	Positive	Negative	Total
English	3,085	2,207	5,292	809	2,374	3,183
French	1,998	2,001	3,999	5,308	7,565	12,873
Spanish	855	1,139	1,994	952	1,289	2,241

- Corpora are homogeneous in terms of the length of wordplay and non-wordplay instances
- Corpora are homogeneous in terms of vocabulary across wordplay and non-wordplay instances

Results for Task 1 pun detection EN

run ID	#	*P*	*R*	F_1	*A*	P^*	R^*	F_1^*	A^*
Croland_EN_GPT3	3,183	**100.00**	0.86	1.71	**74.80**	**100.00**	0.86	1.71	**74.80**
LJGG_t5_large_easy_en	3,183	42.73	71.94	**53.61**	68.36	42.73	71.94	**53.61**	68.36
LJGG_t5_large_label_en	3,183	25.41	**100.00**	40.53	25.41	25.41	**100.00**	40.53	25.41
LJGG_t5_large_no_label_en	3,183	25.41	**100.00**	40.53	25.41	25.41	**100.00**	40.53	25.41
Les_miserables_fasttext	3,183	25.78	80.96	39.11	35.94	25.78	80.96	39.11	35.94
Les_miserables_random	3,183	26.43	51.29	34.88	51.33	26.43	51.29	34.88	51.33
Les_miserables_simplet5	3,183	28.13	88.75	42.72	39.52	28.13	88.75	42.72	39.52
MiCroGerk_EN_BLOOM	13.00	8.33	0.12	0.24	74.26	8.33	**100.00**	15.38	15.38
MiCroGerk_EN_FastText	3,183	25.87	82.94	39.44	35.28	25.87	82.94	39.44	35.28
MiCroGerk_EN_MLP	3,183	29.04	72.92	41.54	47.84	29.04	72.92	41.54	47.84
MiCroGerk_EN_NB	3,183	25.98	95.42	40.84	29.75	25.98	95.42	40.84	29.75
MiCroGerk_EN_Ridge	3,183	26.74	85.16	40.70	36.94	26.74	85.16	40.70	36.94
MiCroGerk_EN_SimpleT5	3,183	30.75	83.06	44.88	48.16	30.75	83.06	44.88	48.16
Smroltra_EN_FastText	3,183	25.62	80.34	38.85	35.72	25.62	80.34	38.85	35.72
Smroltra_Logistic-Regression	3,183	26.14	86.15	40.11	34.62	26.14	86.15	40.11	34.62
Smroltra_EN_MLP	3,183	27.78	72.43	40.16	45.14	27.78	72.43	40.16	45.14
Smroltra_EN_NBC	3,183	26.12	95.55	41.02	30.19	26.12	95.55	41.02	30.19
Smroltra_EN_SimpleT5	3,183	31.97	83.68	46.27	50.61	31.97	83.68	46.27	50.61
Smroltra_EN_TFIDF	3,183	26.90	84.05	40.76	37.92	26.90	84.05	40.76	37.92
TeamCAU_EN_AI21	40	27.58	0.98	1.90	74.17	27.58	80.00	41.02	0.43
TeamCAU_EN_BLOOM	40	30.00	0.37	0.73	74.45	30.00	30.00	30.00	65.00
TeamCAU_EN_FastText	3,183	25.71	80.84	39.02	35.78	25.71	80.84	39.02	35.78
TeamCAU_EN_RandomForest	3,183	25.69	83.43	39.28	34.46	25.69	83.43	39.28	34.46
TeamCAU_EN_ST5	3,183	26.99	93.32	41.87	34.15	26.99	93.32	41.87	34.15
TeamCAU_EN_TFidfRidge	3,183	26.74	85.16	40.70	36.94	26.74	85.16	40.70	36.94
TheLangVerse_fasttext-MLP	3,183	26.31	75.40	39.01	40.08	26.31	75.40	39.01	40.08
ThePunDetectives_Fasttext	3,183	26.07	80.22	39.35	37.16	26.07	80.22	39.35	37.16
ThePunDetectives_NaiveBayes	3,183	25.43	99.62	40.52	25.66	25.43	99.62	40.52	25.66
ThePunDetectives_Ridge	3,183	27.44	88.75	41.92	37.51	27.44	88.75	41.92	37.51
ThePunDetectives_Roberta	3,183	26.11	91.96	40.67	31.82	26.11	91.96	40.67	31.82
ThePunDetectives_SimpleT5	3,183	29.21	93.20	44.48	40.87	29.21	93.20	44.48	40.87
UBO_SimpleT5	3,183	36.51	85.53	51.18	58.52	36.51	85.53	51.18	58.52
AKRaNLU_sentemb	3,183	26.29	86.40	40.32	34.99	26.29	86.40	40.32	34.99
AKRaNLU_seqclassification	3,183	25.41	**100.00**	40.53	25.41	25.41	**100.00**	40.53	25.41
Innsbruck_DS_backtranslation	3,183	27.35	84.91	41.38	38.86	27.35	84.91	41.38	38.86
Innsbruck_DS_r1	3,183	27.32	86.89	41.57	37.92	27.32	86.89	41.57	37.92
Innsbruck_DS_synonym	3,183	27.15	86.89	41.37	37.41	27.15	86.89	41.37	37.41

Results for wordplay detection FR

run ID	#	P	R	F_1	A	P^*	R^*	F_1^*	A^*
Croland_FR_GPT3	12,873	**100.00**	01.14	02.27	59.24	**100.00**	01.14	02.27	59.24
LJGG_t5_large_easy_fr	12,873	55.13	64.29	59.36	63.70	55.13	64.29	59.36	63.70
LJGG_t5_large_label_fr	12,873	41.23	**100.00**	58.39	41.23	41.23	**100.00**	58.39	41.23
LJGG_t5_large_no_label_fr	12,873	41.23	**100.00**	58.39	41.23	41.23	**100.00**	58.39	41.23
Les_miserables_fasttext	12,873	58.57	19.76	29.55	61.15	58.57	19.76	29.55	61.15
Les_miserables_random	12,873	41.14	49.81	45.06	49.92	41.14	49.81	45.06	49.92
Les_miserables_simplet5	12,873	59.72	74.88	**66.45**	68.82	59.72	74.88	**66.45**	68.82
Smroltra_FR_FastText	12,873	55.24	25.00	34.42	60.72	55.24	25.00	34.42	60.72
Smroltra_FR_Logistic-Regression	12,873	58.43	60.39	59.40	65.95	58.43	60.39	59.40	65.95
Smroltra_FR_MLP	12,873	56.49	62.88	59.52	64.73	56.49	62.88	59.52	64.73
Smroltra_FR_NBC	12,873	56.73	63.18	59.78	64.94	56.73	63.18	59.78	64.94
Smroltra_FR_Random	12,873	42.14	67.70	51.95	48.36	42.14	67.70	51.95	48.36
Smroltra_FR_SimpleT5	12,873	61.21	67.69	64.29	**68.99**	61.21	67.69	64.29	**68.99**
Smroltra_FR_TFIDF	12,873	58.77	62.09	60.38	66.41	58.77	62.09	60.38	66.41
UBO_SimpleT5	12,871	67.80	58.76	62.95	71.49	67.80	58.76	62.95	71.48
AKRaNLU_sentemb	12,873	41.18	73.88	52.88	45.71	41.18	73.88	52.88	45.71
AKRaNLU_seqclassification	12,873	41.23	**100.00**	58.39	41.23	41.23	**100.00**	58.39	41.23

Results for Task 1 pun detection ES

run ID	#	P	R	F_1	A	P^*	R^*	F_1^*	A^*
Croland_ES_GPT3	2,241	**98.07**	05.35	10.15	**59.75**	**98.07**	05.35	10.15	59.75
LJGG_t5_large_easy_es	2,230	50.34	54.09	52.15	57.83	50.34	54.26	52.23	57.75
LJGG_t5_large_label_es	2,230	42.55	**99.68**	**59.64**	42.70	42.55	**100.00**	**59.70**	42.55
LJGG_t5_large_no_label_es	2,230	42.55	**99.68**	**59.64**	42.70	42.55	**100.00**	**59.70**	42.55
Les_miserables_fasttext	2,230	0.00	0.00	0.00	57.51	0.00	0.00	0.00	57.44
Les_miserables_random	2,230	43.43	51.78	47.24	50.87	43.43	51.94	47.31	50.76
Les_miserables_simplet5	2,230	51.10	17.01	25.53	57.83	51.10	17.07	25.59	57.75
NLPalma_BERT	2,230	55.94	40.54	47.01	61.17	55.94	40.67	47.10	61.12
Smroltra_ES_FastText	2,238	40.75	0.625	49.33	45.47	40.75	0.625	49.33	45.39
Smroltra_ES_Logistic-Regression	2,238	0.50	49.05	49.52	57.51	0.50	49.05	49.52	57.46
Smroltra_ES_MLP	2,238	55.45	44.32	49.27	**61.22**	55.45	44.32	49.27	61.17
Smroltra_ES_NBC	2,238	47.69	56.40	51.68	55.19	47.69	56.40	51.68	55.13
Smroltra_ES_Random	2,241	42.05	67.85	51.92	46.63	42.05	67.85	51.92	46.63
Smroltra_ES_SimpleT5	2,238	44.31	46.21	45.24	52.47	44.31	46.21	45.24	52.41
Smroltra_ES_TFIDF	2,238	53.34	46.11	49.46	59.97	53.34	46.11	49.46	59.91
UBO_SimpleT5	2,230	51.28	62.92	56.50	58.85	51.28	63.11	56.58	58.78
AKRaNLU_sentemb	2,230	41.39	72.26	52.63	44.75	41.39	72.49	52.70	44.61
AKRaNLU_seqclassification	2,230	42.55	**99.68**	**59.64**	42.70	42.55	**100.00**	**59.70**	42.55

Conclusions on Task 1

- Homogeneous corpus in terms of vocabulary & length for pun detection in EN, FR, & ES
- 12 participants, 75 runs
  - Traditional classifiers & LLMs
- Pun detection is still a challenging task
  - maximum $F_1 = 60$–65%
- T5 trained on our corpus appeared to be most effective for all the languages
- Performance of methods varied depending on implementation, fine-tuning, the specific prompts used, etc.
- Overfitting issues
- Incomplete runs (LLMs)
  - time $\rightarrow$ importance of efficiency
  - token limits

Task 2: Pun Location & Interpretation

- *Pun location* is a finer-grained task, where the goal is to identify which words carry the double meaning in a text known *a priori* to contain a pun.
- In *pun interpretation*, systems have to indicate the two meanings of the pun.
  - lemmatised word sets: synonyms or hypernyms of the two words involved in the pun
- **Data**: manually annotated corpus from Task 1 in EN and FR
- **Evaluation**: average scores for each of senses in terms of P, R, F1, Acc

(3) When the church bought gas for their annual barbecue, proceeds went from the sacred to the **propane**. - {*gas, fuel*} & {*profane*}

(4) I used to be a banker but I lost **interest**. - {*involvement*} & {*fixed charge*, *fixed cost*, *fixed costs*}

Dataset statistics for Task 2

Language	Train	Test
English	2,315	1,205
French	2,000	4,655
Spanish	876	960

Results for Task 2.1 (pun location)

	EN			FR			ES		
run ID	#	*A*	A^*	#	*A*	A^*	#	*A*	A^*
Croland_GPT3	19	0.41	26.31	61	0.20	18.03	51	1.77	33.33
Les_miserables_random	1205	8.87	8.87	4655	4.37	4.98	960	6.14	6.14
Les_miserables_simplet5	1205	76.18	76.18	4655	39.92	45.49	960	55.41	55.41
Les_miserables_word	1205	49.54	49.54	4655	28.67	32.67	960	51.56	51.56
Smroltra_BLOOM	32	1.74	65.62	65	0.41	33.84	57	2.60	43.85
Smroltra_GPT3	32	2.15	81.25	65	0.56	46.15	57	5.20	87.71
Smroltra_SimpleT5	1205	79.50	79.50	4655	39.86	45.43	960	**82.81**	82.81
Smroltra_SpaCy	1205	44.48	44.48	4655	0.00	0.00	960	24.16	24.16
UBO_SimpleT5	1205	77.67	77.67	4655	40.39	46.03	960	57.70	57.70
AKRaNLU_x	1205	77.51	77.51	4655	40.56	46.22	960	54.27	54.27
AKRaNLU_y	1205	79.17	79.17	4655	**41.35**	47.13	960	56.14	56.14
TeamCAU_AI21	32	1.16	43.75	—	—	—	—	—	—
TeamCAU_BLOOM	32	1.24	46.87	—	—	—	—	—	—
TeamCAU_ST5	1205	80.66	80.66	—	—	—	—	—	—
ThePunDetectives_Fasttext	1205	5.06	5.06	—	—	—	—	—	—
ThePunDetectives_NaiveBayes	1205	2.07	2.07	—	—	—	—	—	—
ThePunDetectives_Ridge	1205	50.20	50.20	—	—	—	—	—	—
ThePunDetectives_SimpleT5	1205	80.41	80.41	—	—	—	—	—	—
ThePunDetectives_SimpleTransformersT5	1205	**83.15**	83.15	—	—	—	—	—	—
MiCroGerk_AI21	17	1.32	94.11	—	—	—	—	—	—
MiCroGerk_BLOOM	17	0.99	70.58	—	—	—	—	—	—
MiCroGerk_OpenAI	17	1.24	88.23	—	—	—	—	—	—
MiCroGerk_SimpleT5	1205	79.91	79.91	—	—	—	—	—	—
MiCroGerk_lastWord	1205	54.43	54.43	—	—	—	—	—	—
MiCroGerk_random	1205	13.94	13.94	—	—	—	—	—	—

Results for Task 2.2 EN (interpretation)

run	count	score	part_score
C&O_task_2.2_Chat GPT	92	5.45%	**70.65%**
Croland_task_2_EN_GPT3	29	0.08%	3.45%
Les_miserables_simplet5	1,192	**47.40%**	47.40%
MiCroGerk_task_2_EN_AI21	11	0.46%	50.00%
MiCroGerk_task_2_EN_BLOOM	2	0.04%	25.00%
MiCroGerk_task_2_EN_OpenAI	11	0.34%	36.36%
MiCroGerk_task_2_EN_SimpleT5	39	1.59%	48.72%
Smroltra_task_2_Bloom	32	0.59%	21.88%
Smroltra_task_2_GPT3	32	0.59%	21.88%
Smroltra_task_2_GPT3_WN	32	1.09%	40.63%
Smroltra_task_2_SimpleT5_WN	1192	41.44%	41.44%
Smroltra_task_2_bloom_WN	32	0.80%	29.69%
Smroltra_task_2_spaCy_WN	1,192	19.76%	19.76%
UBO_task_2.2_SimpleT5	1,192	46.85%	46.85%
akranlu_task_2.2_sentembwordnet	1,192	39.77%	39.77%

Conclusions on Task 2

- Semantic annotation for wordplay in English and French
  - a new corpus for pun location in Spanish
  - 9 teams, 64 runs
    - similar methods, but different results
- Wordplay location is still a challenge for LLMs
  - results for pun location in FR are quite low (different data creation procedures?)
    - Some of the puns in EN & ES might have been "known" by LLMs
    - French data was novel and largely constructed by us
  - Overfitting
- Pun interpretation is quite a challenging task due to the inherent ambiguity and creativity of puns
  - We evaluated pun interpretation only for EN
  - Many partial runs

Task 3: Pun Translation

- The goal of this task is to translate English punning jokes into French and Spanish:
  - contain an instance of wordplay
  - preserve wordplay meaning
- **Data:** English puns from Task 1 manually translated into French and Spanish
- **Evaluation:** Experts

Task 3 dataset statistics

	Train		Test	
Language	**target**	**source**	**target**	**source**
French	5,838	1,405	6,590	1,197
Spanish	644	217	5,727	544

Results for pun translation EN→FR

run ID	#E	#T	#M	%M	#W	%W	#S	%S	%R
Croland_GPT3	16	28	4	25	0	0	0	0	0
LJGG_Google_Translator_auto	1,076	1,197	580	53	67	6	63	5	5
LJGG_fr_mt5_base_auto	2	1,197	2	100	1	50	1	50	0
LJGG_fr_mt5_base_no_label_auto	1	1,197	1	100	0	0	0	0	0
LJGG_fr_t5_large_auto	90	1,197	24	26	2	2	2	2	0
LJGG_fr_t5_large_no_label_auto	140	1,197	80	57	15	10	15	10	1
Smroltra_BLOOM	31	32	8	25	0	0	0	0	0
Smroltra_EasyNMT-Opus	786	1,197	427	54	58	7	56	7	4
Smroltra_EasyNMT-mbart	1,139	1,197	613	53	68	5	64	5	5
Smroltra_GPT3	30	32	8	26	0	0	0	0	0
Smroltra_GoogleTranslation	1,109	1,197	602	54	71	6	67	6	5
Smroltra_SimpleT5	1,043	1,197	562	53	66	6	65	6	5
TeamCAU_AI21	30	32	8	26	0	0	0	0	0
TeamCAU_BLOOM	32	32	8	25	0	0	0	0	0
TeamCAU_ST5	1,090	1,197	577	52	71	6	69	6	5
TheLangVerse_j2-grande-finetuned	1,176	1,197	636	54	76	6	**72**	6	6
ThePunDetectives_M2M100	13	340	9	69	2	15	2	15	0
ThePunDetectives_OpusMT	183	340	92	50	19	10	17	9	1
UBO_SimpleT5	73	1,195	47	64	5	6	5	6	0
UBO_SimpleT5_x	1,148	1,195	616	53	71	6	67	5	5
UBO_SimpleT5_y	791	1,194	429	54	61	7	59	7	5

Results for pun translation EN→ES

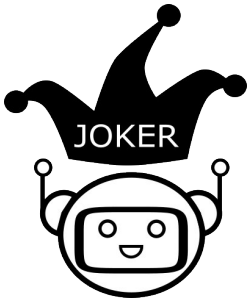
run ID	#E	#T	#M	%M	#W	%W	#S	%S	%R
Croland_ENESGPT3	45	47	9	20.00	3	6.66	3	6.66	0
LJGG_es_mt5_base_auto	34	544	16	47.05	5	14.70	5	14.70	0
LJGG_es_mt5_base_no_label_auto	34	544	16	47.05	5	14.70	5	14.70	0
LJGG_es_t5_large_auto	34	544	16	47.05	5	14.70	5	14.70	0
LJGG_es_t5_large_no_label_auto	34	544	16	47.05	5	14.70	5	14.70	0
LJGG_GoogleTranslatorENESauto	544	544	274	50.36	106	19.48	**99**	18.19	18
NLPalma_BLOOMZ_x	359	359	215	59.88	85	23.67	80	22.28	14
NLPalma_BLOOMZ_y	359	359	215	59.88	85	23.67	80	22.28	14
Smroltra_EasyNMT-Opus	529	544	263	49.71	100	18.90	93	17.58	17
Smroltra_GoogleTranslation	532	544	267	50.18	103	19.36	96	18.04	17
Smroltra_SimpleT5	531	544	265	49.90	101	19.02	94	17.70	17
Smroltra_ENESBLOOM	45	47	8	17.77	2	4.44	2	4.44	0
TheLangVerse_j2-grande-finetuned	415	544	200	48.19	70	16.86	65	15.66	11
ThePunDetectives_M2M100	33	430	16	48.48	7	21.21	7	21.21	1
ThePunDetectives_ENESOpusMT	428	430	208	48.59	71	16.58	66	15.42	12
MiCroGerk_OpenAI	6	17	3	0.5	1	16.66	1	16.66	0
MiCroGerk_mbart50_m2m_x	543	544	274	50.46	106	19.52	**99**	18.23	18
MiCroGerk_AI21_x	1	17	1	1	0	0	0	0	0
MiCroGerk_m2m_100_418M	43	544	23	53.48	11	25.58	11	25.58	2
MiCroGerk_SimpleT5	5	544	4	0.8	3	0.6	3	0.6	0

Conclusions on Task 3

- New parallel corpora of wordplay EN-FR & EN-ES
- Manual evaluation $\rightarrow$ augmented data for wordplay detection
- Success rate of wordplay translation is extremely low for both language pairs
  - Max of 6% over the total evaluated *test* set for FR
  - Max of 17% over the total evaluated *train* set for FR
  - Max of 18% over the total evaluated *test* set for ES

JOKER program (ROOM 3)

- Wed 20th Sept (TODAY) - CONFERENCE Session 5 NLP (Room 1)
  - *Humour Translation with Transformers*, Farhan Dhanani, Muhammad Rafi and Muhammad Atif Tahir (Best of the Labs 2022)
- Thu 21th Sept (TOMORROW)
  - JOKER Session 1 at 09:30 - 11:00
    - Invited talk by Jussi Karlgren (Silo AI) on *How to evaluate delight and diversion?*
    - JOKER Track overview papers
  - JOKER Session 2 at 11:30 - 13:00
    - Participant presentations
  - JOKER Session 3 at 14:00 - 15:30
    - Invited talk by Alexander Libov (Amazon) on *Characterizing Playful Requests to Virtual Assistants and Evaluating Playful Response Generation*
    - Round table and JOKER 2024 discussion



Thank you !

Participate in our track !

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Google group : https://groups.google.com/g/joker-project

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