Visual Story Post-Editing

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What is a Visual Storytelling (VIST) task?

- Input: A sequence of **five photos**
- Output: A **short story** describing the photo sequence.
- The VIST dataset [1] contains 20,211 photo sequences, aligning to human-written stories.

[1] Huang, et al. "Visual Storytelling". NAACL'16.

Ok, but why automatic post-editing (APE)?

- Machine-generated stories is not good enough.
- **APE** leverages the **user-edit data** on VIST.
- APE corrects systematic errors of the model and improves story quality.

How?

- Learn the transformation **from machine-generated story to human-edited story**.
- Augment data by sorting the similarities between edited stories and the original story.
- **End-to-end LSTM** and **Transformer** are utilized.
- Two different input setting:
  - Text only *(T)*
  - Text and Images *(T+I)*

Hmmm, tell me about the *VIST-Edit* dataset?

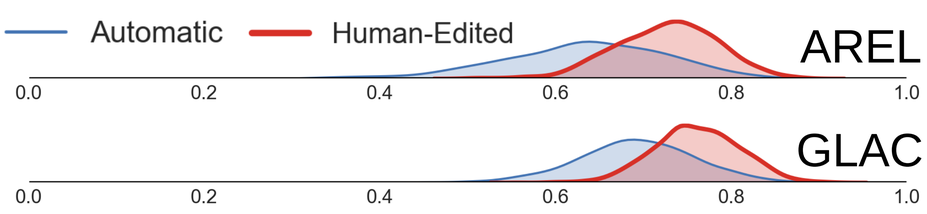
- **2,981 stories** generated by GLAC [2] & AREL [3].
- **5 crowd workers** from MTurk to edit each story, respectively.
- 2,981*5 = **14,905 human-edited stories** are collected.

Avg. #Token

AREL	.	ADJ	ADP	ADV	CONJ	DET	NOUN	PRON	PRT	VERB	Total
Pre	5.2	3.1	3.5	1.9	0.5	8.1	10.1	2.1	1.6	6.9	43.0
Post	4.7	3.1	3.4	1.9	0.8	7.1	9.9	2.3	1.6	7.0	41.9
Δ	-0.5	0.0	-0.1	-0.1	0.4	-1.0	-0.2	0.2	0.0	0.1	-1.2

GLAC	.	ADJ	ADP	ADV	CONJ	DET	NOUN	PRON	PRT	VERB	Total
Pre	5.0	3.3	1.7	1.9	0.2	6.5	7.4	1.2	0.8	6.9	35.0
Post	4.5	3.2	2.4	1.8	0.8	6.1	8.3	1.5	1.0	7.0	36.7
Δ	-0.5	-0.1	0.7	-0.1	0.6	-0.3	0.9	0.3	0.2	0.1	1.7

Type-Token Ratio (TTR)



- **Lexical diversity (TTR)** systematically increases.
- People **shorten AREL's stories but lengthen GLAC's stories**. *(Why?)*

[2] Kim, et al. "GLACNet: GLocal Attention Cascading Networks for Multi-image Cued Story Generation."
[3] Wang, et al. "No metrics are perfect: Adversarial reward learning for visual storytelling." ACL'18.

Does it work?

	AREL					
Edited By	Focus	Coherence	Share	Human	Grounded	Detailed
N/A	3.487	3.751	3.763	3.746	3.602	3.761
TF (T)	3.433	3.705	3.641	3.656	3.619	3.631
TF (T+I)	**3.542**	3.693	3.676	3.643	3.548	3.672
LSTM (T)	**3.551**	**3.800**	**3.771**	**3.751**	**3.631**	**3.810**
LSTM (T+I)	**3.497**	3.734	3.746	3.742	3.573	3.755
Human	3.592	3.870	3.856	3.885	3.779	3.878

	GLAC					
Edited By	Focus	Coherence	Share	Human	Grounded	Detailed
N/A	3.878	3.908	3.930	3.817	3.864	3.938
TF (T)	3.717	3.773	3.863	3.672	3.765	3.795
TF (T+I)	3.734	3.759	3.786	3.622	3.758	3.744
LSTM (T)	**3.894**	3.896	3.864	**3.848**	3.751	3.897
LSTM (T+I)	3.815	3.872	3.847	3.813	3.750	3.869
Human	4.003	4.057	4.072	3.976	3.994	4.068

Human Evaluation

Generated By GLAC
the wedding was a beautiful event. the bride and groom were very happy. they had a great time at the reception. the couple were so excited. the bride and groom were very happy.

Edited By LSTM (Text-Only)
the wedding was a beautiful event. the bride and groom were very happy. the weather was perfect. all of the guests had a great time. everyone was dancing.

Generated By AREL
we had a great time at the wedding today. the bride and groom were very happy to be married. the bride and groom were very happy to be married. the bride and groom pose for a picture. at the end of the wedding, the bride and groom pose for a picture.

Edited By LSTM (Text-Only)
the wedding was held in a beautiful church. the bride and groom walked down the aisle. they were very happy to be married. the couple looked so lovely together. the bride and groom danced the night away at the reception.

Auto evaluation is still hard

- **Auto evaluation scores ↓ Human judgements ↑**
- **Low correlation** between auto evaluation scores and human judgments.

Reference: AREL Stories **Edited** by Human

	BLEU4	METEOR	ROUGE	Skip-Thoughts	Human Rating
AREL	0.93	0.91	0.92	0.97	**3.69**
AREL Edited By LSTM(T)	0.21	0.46	0.40	0.76	**3.81**

Reference: Human-**Written** Stories

	BLEU4	METEOR	ROUGE	Skip-Thoughts
GLAC	0.03	0.30	0.26	0.66
GLAC Edited By Human	0.02	0.28	0.24	0.65

Spearman rank-order correlation ρ

	Data Includes	BLEU4	METEOR	ROUGE	Skip-Thoughts
①	AREL	.110	.099	.063	.062
②	LSTM-Edited AREL	.106	.109	.067	.205
③	①+②	.095	.092	.059	.116
④	GLAC	.222	.203	.140	.151
⑤	LSTM-Edited GLAC	.163	.176	.138	.087
⑥	④+⑤	.196	.194	.148	.116
⑦	①+④	.091	.086	.059	.088
⑧	②+⑤	.089	.103	.067	.101
⑨	①+②+④+⑤	.090	.096	.069	.094

Spearman rank-order correlation between the auto eval scores and human judgment.