Person Search with Natural Language Description

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Language-Based Person Search

Finding person images in image databases given the person's language descriptions.

Query Description

The woman is wearing a long, bright orange gown with a white belt at her waist. She has her hair pulled back into a bun or ponytail.

Retrieval Results

Person Image Database

Gated Neural Attention (GNA-RNN)

- Latent visual concepts (blue branch)

$$v = CNN(Img), v \in \mathbb{R}^d$$

- Word-concept attention

$$A_t = f_1\big(LSTM(W_t)\big), A_t \in \mathbb{R}^d$$

- Word-level importance

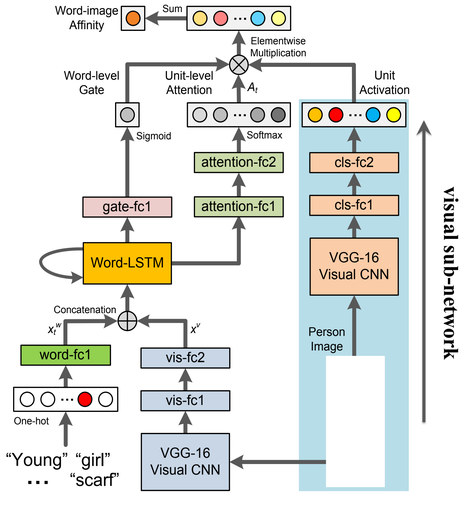
$$g_t = f_2\big(LSTM(W_t)\big), g_t \in \mathbb{R}$$

- Word-image affinity

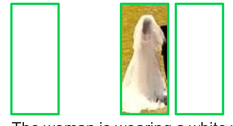
$$\hat{a}_t = g_t \sum_{n=1}^{d} A_t(n) v_n, \quad \sum_{n=1}^{d} A_t(n) = 1$$

- Sentence-image affinity

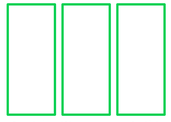
$$\hat{a} = \sum_{t=1}^{T} \hat{a}_t$$



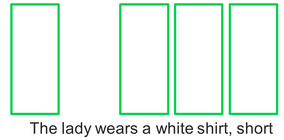
Qualitative Search Results



The woman is wearing a white wedding dress with brown hair pulled back into a long veil. The dress is cinched with a white ribbon belt.

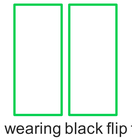


A girl with a ponytail is wearing a red top with gray denim thigh-high skirt. She is carrying a yellow shoulder bag and looking at a phone.

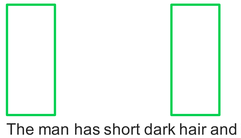


The lady wears a white shirt, short flowered skirt as she stands on the floor.

A man is wearing an orange polo shirt and black pants, and he is walking away.



He is wearing black flip flops, black shorts with a white stripe on the side, and a yellow shirt with short sleeves and a rounded neck.



The man has short dark hair and is wearing a white tuxedo jacket, white tuxedo shirt, black bow tie, black dress pants, and black shoes.

CUHK-PEDES Dataset

The woman is dressed up like Marilyn Monroe, with a white dress that is blowing upward in the wind, short curly blonde hair, and high heels.

The man is wearing blue scrubs with a white lab coat on top. He is holding paperwork in his hand and has a name badge on the left side of his coat.

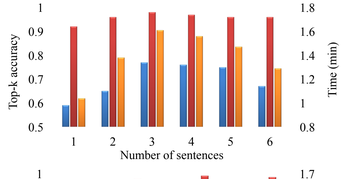
#dataset	#img	#person	#img/person
5 (re-id)	40206	13003	3.09

#sent.	#word	#sent./img	#word/sent.
80412	9408	2	23.5

User Study on CUHK-PEDES

- Expressive power in terms of the number of sentences and sentence length.
- Expressive power of different word types.

	orig. sent.	w/o nouns	w/o adjs	w/o verbs
top1	0.59	0.38	0.44	0.57
top5	0.92	0.81	0.85	0.92
time	1.14	1.01	0.98	1.12



Quantitative Results

	NeuralTalk [1]	CNN-RNN [2]	EmbBoW	GNA-RNN
top1	13.66	8.07	8.38	19.05
top10	41.72	32.47	30.76	53.64
	QAWord	QAWord-img	QABoW	-
top1	11.62	10.21	8.00	-
top10	42.42	44.53	30.56	-

	GNA-RNN	w/o pre-train	w/o gates	w/o attention
top1	19.05	8.93	13.86	4.85
top10	53.64	32.32	44.27	27.16

[1] Show and tell: A neural image caption generator, *CVPR*, 2015
[2] Learning deep representations of fine-grained visual descriptions, *CVPR*, 2016