Extracting Possessions from Social Media: Images Complement Language

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Agenda

- Motivation
- Previous work
- Corpus
- Terminology
- Annotations and Labels
- Examples
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- Conclusion

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Motivation: Identify possessions from social media

- Possession
  - one entity (possessee) belongs to another entity (possessor)
  - abstract - John has a cold
  - part-whole - John’s arm
  - physical - John’s car

- Social media posts often include an image

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Previous work

- Tratz and Hovey
  - Identify possessions as one of 17 many relations from possessive constructs

- Banea et al.
  - Identify possessions between authors of blogs and objects mentioned in blog

- Chinnappa and Blanco
  - Identify possessions generating plausible possessor-possessee pairs from a sentence

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Corpus: Tweets including text and an image

- 5000 English tweets
- Should include one of the words
  I, me, my, mine
- Should include a word that is subsumed by one of the chosen WordNet synsets

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Terminology

Possessor: John's car
Possessee: John's car (only concrete physical entities)
Type: Alienable (ownership) or control
John borrowed Mary's jacket

Temporal Anchors: Before, During or After (the day of tweet)

Interest in possessee: I love those shoes

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Annotations and Labels

Possession existence: Yes, Never, Unknown

Possession type: Alienable, Control

Temporal anchors: Before, During, After

Interest in possessee: Yes, No

Agreement: 0.78 to 0.8 kappa

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Examples

Possessee: bike

Possession existence: Yes

Possession type: Alienable

Temporal anchor: Before

Interest in possessee: Yes

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Examples

Possessee: jacket

Possession existence: Yes

Possession type: Control

Temporal anchor: During

Interest in possessee: No

Examples

Possessee: bag

Possession existence: Yes

Possession type: Alienable

Temporal anchor: Before, During, After

Interest in possessee: Yes

Examples

Possessee: sunglasses

Possession existence: Never

Possession type: --

Temporal anchor: --

Interest in possessee: No

Examples

Possessee: Pants

Possession existence: Never

Possession type: --

Temporal anchor: --

Interest in possessee: No

Examples

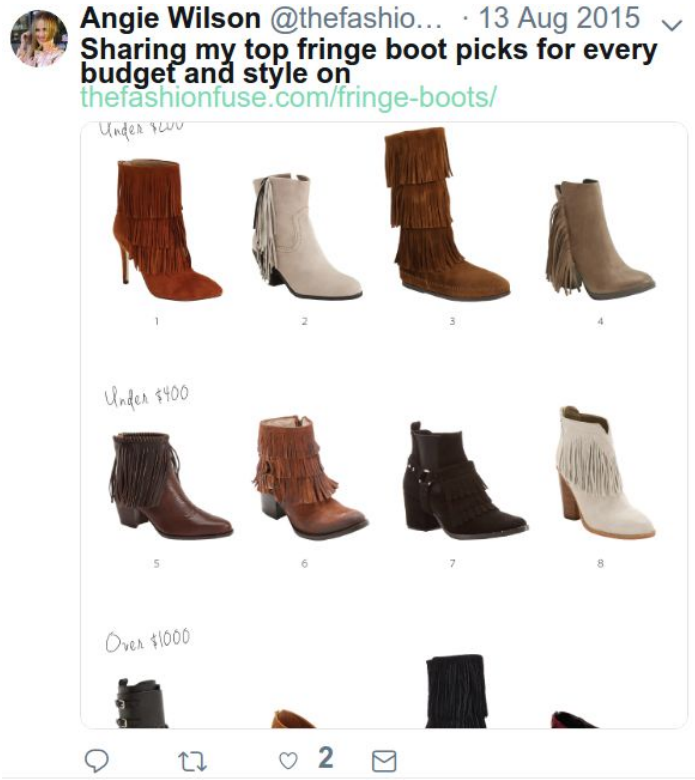
Possessee: boot

Possession existence: Unknown

Possession type: --

Temporal anchor: --

Interest in possessee: Yes



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Text vs. Text+Image

Possessee: denim

Possession existence: Unknown

Possession type: --

Temporal anchor: --

Interest in possessee: No

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Text vs. Text+Image

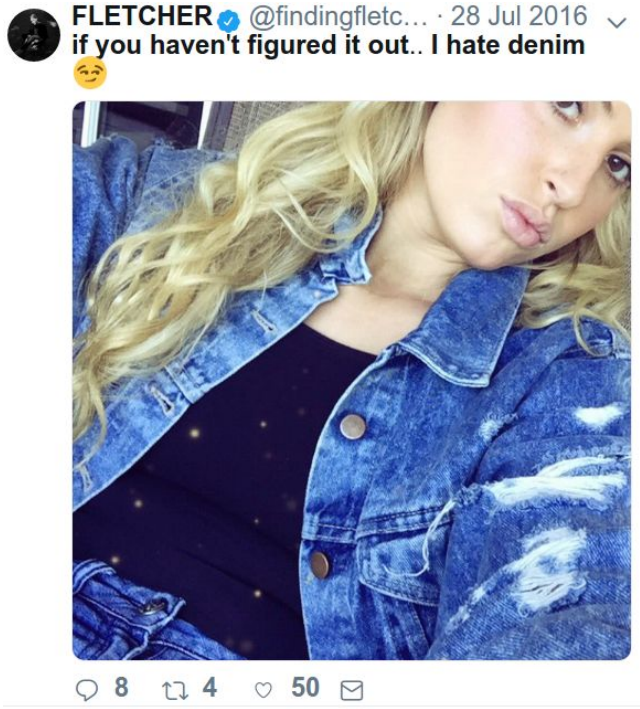
Possessee: denim

Possession existence: Yes

Possession type: Alienable

Temporal anchor: Before, During, After

Interest in possessee: Yes



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Text vs. Text+Image

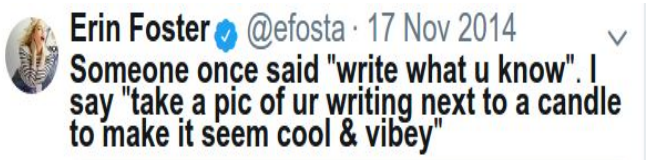
Possessee: candle

Possession existence: Unknown

Possession type: --

Temporal anchor: --

Interest in possessee: No



Text vs. Text+Image

Possessee: candle

Possession existence: Yes

Possession type: Alienable

Temporal anchor: Before, During, After

Interest in possessee: No

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Text vs. Text+Image

Possessee: hat

Possession existence: Yes

Possession type: Alienable

Temporal anchor: Before, During, After

Interest in possessee: No

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Text vs. Text+Image

Possessee: hat

Possession existence: Never

Possession type: --

Temporal anchor: --

Interest in possessee: No

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Text vs. Text+Image

		Only Text			
		Alienable	Control	Never	Unknown
Text + Image	Alienable	80.5%	7.8%	10.0%	38.7%
	Control	9.4%	82.8%	3.0%	12.2%
	Never	8.3%	6.3%	83.3%	23.4%
	Unknown	1.8%	3.1%	4.7%	25.7%
Total		100%	100%	100%	100%

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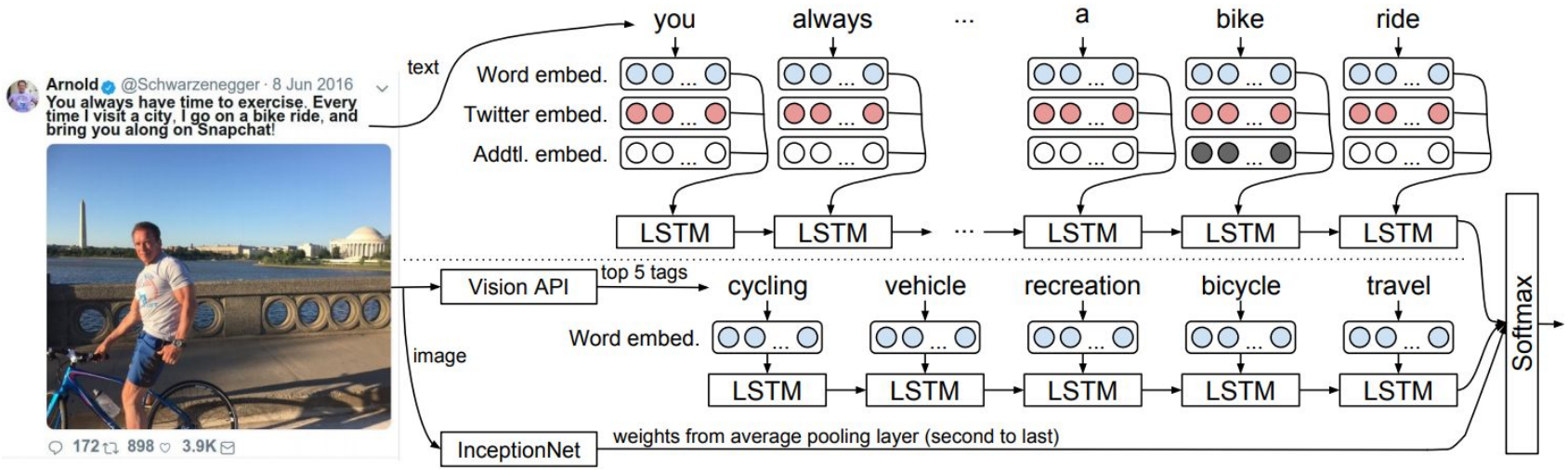
Architecture

Text component: Glove embeddings
Image component: InceptionNet weights + Vision API tags



Results

Label		Only text			Text + Image			T + I + Vision		
		P	R	F	P	R	F	P	R	F
Possession Existence	Yes	0.7	0.69	0.69	0.7	0.72	0.71	0.73	0.78	0.76
	Never	0.57	0.55	0.56	0.57	0.57	0.57	0.64	0.63	0.63
	Unknown	0.57	0.55	0.56	0.51	0.47	0.49	0.64	0.53	0.58
	Average	0.61	0.6	0.6	0.59	0.59	0.59	0.67	0.65	0.66
Possession Type	Alienable	0.84	0.94	0.89	0.84	0.95	0.89	0.83	0.92	0.88
	Control	0.19	0.07	0.1	0.21	0.07	0.1	0.75	0.82	0.77
	Average	0.52	0.51	0.5	0.53	0.51	0.5	0.79	0.87	0.83
	Yes	0.54	0.39	0.45	0.52	0.48	0.5	0.52	0.43	0.47

Conclusions

- First to extract possessions including a text and an image
- Annotations show images are useful in deciding possessions.
  - 73% of *Unknown*s change to *Yes* (alienable or control) or *Never*
- Experimental results show vision tags embedded as pre-trained word embeddings is beneficial

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