

# Extracting Possessions from Social Media: Images Complement Language

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**Objective:** To extract possession existence, type, temporal anchors, and interest in possessee from social media posts including a text and an image

**Possession:** The state where a possessor has or controls a possessee

**Possessor:** An entity having or controlling another entity     *John's car*

**Possessee:** An entity belonging to another entity     *John's car*

**Type:** **Alienable** (ownership) or **control**     *John borrowed Mary's Jacket*

**Temporal Anchors:** When does the possession hold? *I bought this pen yesterday*

## Interest in possessee: Is the plausible possessor excited about the plausible possessee?

*I love those shoes*

## Dataset:

## English Tweets

- Text + Images
- Contain *I, me, my, or mine*

## Labels:







**Possession existence:** Yes, Never,Unk.

**Possession type:** Alienable, Control


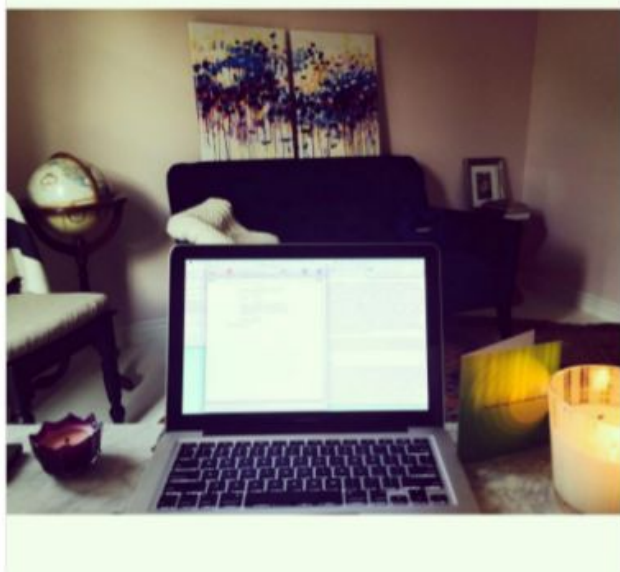
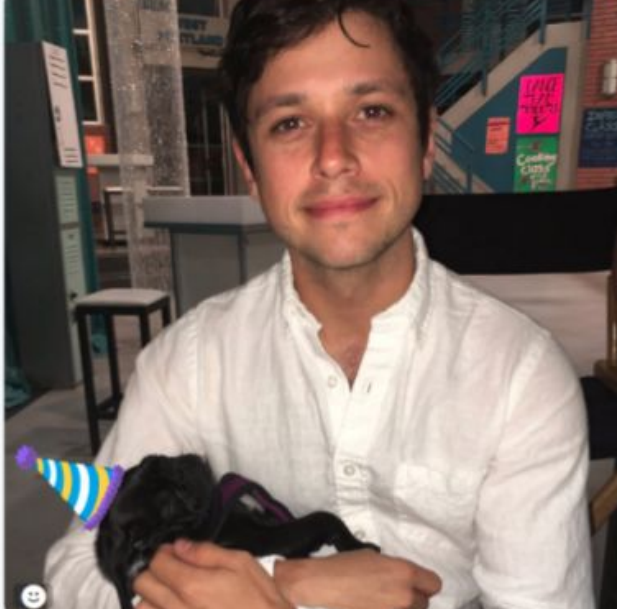
## Temporal anchors: Bef, Dur, Aft

**Interest in possessee: Yes, No**

## Cohen's kappa: 0.78 to 0.8

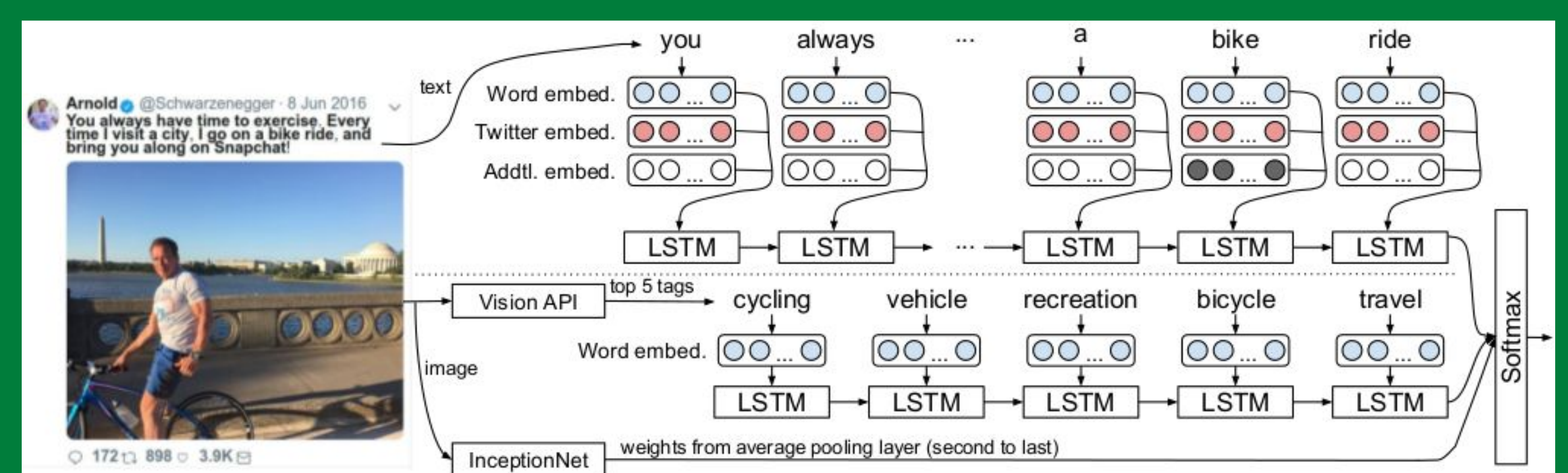
<p>a) Sam Milby @samuelmily · 10 Aug 2016          This was about 2 years ago... I miss being on a bike 🏍️ #Motox</p>  <p>7 1 27 396</p>	<p>b) Jenn Im @jimmim · 6 Aug 2015          Borrowed my man's jacket for the weekend. I miss you. #jennimsuit 🍋 #missjimm</p>  <p>3 1 31 416</p>	<p>c) Olivia Bowen Buckland · 13 Aug 2016          Off to Newquay with my 🍋 #Bowlz🍋 In love with my cutest bag ever 🍋 #Bowlz🍋</p>  <p>7 1 16 429</p>																		
<p>Possessee: <i>bike</i></p> <table border="1"> <thead> <tr> <th>Ex., Type</th> <th>Temporal</th> <th>Interest</th> </tr> </thead> <tbody> <tr> <td>alienable</td> <td>B</td> <td>yes</td> </tr> </tbody> </table>	Ex., Type	Temporal	Interest	alienable	B	yes	<p>Possessee: <i>jacket</i></p> <table border="1"> <thead> <tr> <th>Ex., Type</th> <th>Temporal</th> <th>Interest</th> </tr> </thead> <tbody> <tr> <td>control</td> <td>D</td> <td>no</td> </tr> </tbody> </table>	Ex., Type	Temporal	Interest	control	D	no	<p>Possessee: <i>bag</i></p> <table border="1"> <thead> <tr> <th>Ex., Type</th> <th>Temporal</th> <th>Interest</th> </tr> </thead> <tbody> <tr> <td>alienable</td> <td>B, D, A</td> <td>yes</td> </tr> </tbody> </table>	Ex., Type	Temporal	Interest	alienable	B, D, A	yes
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<p>d) Laina @laina622 · 11 Jul 2016          My niece in a hat that's too big for her and baby sunglasses is my favorite thing</p>  <p>9 1 14 387</p>	<p>e) Angie Wilson @thefashio... · 13 Aug 2015          Sharing my fringe boot picks for every budget and style on theshoohouse.com/fringe-boots/</p>  <p>12 1 2 0</p>	<p>f) Sarah @sawcatsims · 22 Jul 2016          Please tell me Walken is Mr Fuzzy Pants</p>  <p>11 1 1 0</p>																		
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## Text vs. Text + Image

	(a)				(b)				(c)			
	FLETCHER @findinfletc. · 28 Jul 2016 if you haven't figured it out. I hate denim				Erin Foster @efosta · 17 Nov 2014 Someone once said "write what u know". I say "take a pic of ur writing next to a candle to make it seem cool & vibey"				Raviv Ullman @ravivullman · 10 Aug 2016 Here's me with a sleeping pup pup. I gave him a party hat because he's worth celebrating.			
	 8 14 59				 2 16 23				 11 52 366			
	Possessee: <i>denim</i>				Possessee: <i>candle</i>				Possessee: <i>hat</i>			
	Ex., Type	Temporal	Interest		Ex., Type	Temporal	Interest		Ex., Type	Temporal	Interest	
T	unk	n/a	no		unk	n/a	no		alienable	B, D, A	no	
T+I	alienable	B, D, A	yes		alienable	B, D, A	no		never	n/a	no	

## Automatic Extraction

- Text: Glove Common Crawl and Twitter embeddings, possessee embeddings.
- Image: Weights from InceptionNet, Top 5 tags from cloud vision API.



## Results:

Label		Only text			Text + Image			Text + Image + Vision tags		
		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
	Unk.	0.57	0.55	0.56	0.51	0.47	0.49	0.64	0.53	0.58
	Avg.	0.61	0.6	0.6	0.59	0.59	0.59	0.67	0.65	0.66
Possession Type	Alien.	0.84	0.94	0.89	0.84	0.95	0.89	0.83	0.92	0.88
	Cont.	0.19	0.07	0.1	0.21	0.07	0.1	0.75	0.82	0.77
	Avg.	0.52	0.51	0.5	0.53	0.51	0.5	0.79	0.87	0.83
Interest in Possessee	Yes	0.54	0.39	0.45	0.52	0.48	0.5	0.52	0.43	0.47
	No	0.64	0.77	0.7	0.65	0.68	0.67	0.64	0.72	0.68
	Avg	0.61	0.58	0.58	0.59	0.58	0.59	0.58	0.58	0.58

## Conclusion

- We extract possessions from text and image.
- Humans identify more possessions when the image is available.
- Neural networks benefit from incorporating events and objects identified in an image as additional textual input.