Distributed word representations: word-sense disambiguation

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CS 244U: Natural language understanding

The challenge

d_1 The crane is a bird.

d_2 The crane is a bird that can fly.

d_3 The crane is a tall bird that can fly.

d_4 The crane is a tall piece of equipment that can hoist.

d_5 The crane is equipment that can hoist tall things.

d_6 The crane is equipment

The challenge

- d_1 The crane is a bird.
- d_2 The crane is a bird that can fly.
- d_3 The crane is a tall bird that can fly.
- d_4 The crane is a tall piece of equipment that can hoist.
- d_5 The crane is equipment that can hoist tall things.
- d_6 The crane is equipment

	d_1	d_2	d_3	d_4	d_5	d_6
crane	1	1	1	1	1	1
bird	1	1	1	0	0	0
fly	0	1	1	0	0	0
equipment	0	0	0	1	1	1
hoist	0	0	0	1	1	0
tall	0	0	1	1	1	0

The method

	d_1	d_2	d_3	d_4	d_5	d_6
crane	1	1	1	1	1	1
bird	1	1	1	0	0	0
fly	0	1	1	0	0	0
equipment	0	0	0	1	1	1
hoist	0	0	0	1	1	0
tall	0	0	1	1	1	0

An illustration

	d_1	d_2	d_3	d_4	d_5	d_6
crane	1	1	1	1	1	1
bird	1	1	1	0	0	0
fly	0	1	1	0	0	0
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hoist	0	0	0	1	1	0
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	d_1	d_2	d_3	d_4	d_5	d_6
crane_0	1	1	1	0	0	0
crane_1	0	0	0	1	1	1
bird_0	1	0	0	0	0	0
bird_1	0	1	1	0	0	0
fly_0	0	1	0	0	0	0
fly_1	0	0	1	0	0	0
equipment_0	0	0	0	1	1	0
equipment_1	0	0	0	0	0	1
hoist_0	0	0	0	1	0	0
hoist_1	0	0	0	0	1	0
tall_0	0	0	1	0	0	0
tall_1	0	0	0	1	0	0
tall_2	0	0	0	0	1	0

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crane_1	0	0	0	1	1	1
bird_0	1	0	0	0	0	0
bird_1	0	1	1	0	0	0
fly_0	0	1	0	0	0	0
fly_1	0	0	1	0	0	0
equipment_0	0	0	0	1	1	0
equipment_1	0	0	0	0	0	1
hoist_0	0	0	0	1	0	0
hoist_1	0	0	0	0	1	0
tall_0	0	0	1	0	0	0
tall_1	0	0	0	1	0	0
tall_2	0	0	0	0	1	0

	crane_0
bird_1	0.18
bird_0	0.42
fly_0	0.42
fly_1	0.42
tall_0	0.42
crane_1	1.0
equipment_0	1.0
equipment_1	1.0
hoist_0	1.0
hoist_1	1.0
tall_1	1.0
tall_2	1.0

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bird_1	0	1	1	0	0	0
fly_0	0	1	0	0	0	0
fly_1	0	0	1	0	0	0
equipment_0	0	0	0	1	1	0
equipment_1	0	0	0	0	0	1
hoist_0	0	0	0	1	0	0
hoist_1	0	0	0	0	1	0
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tall_1	0	0	0	1	0	0
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Closing remarks

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Improvements

- The clustering algorithm
- Collapsing spurious ambiguities

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Further reading

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- Huang, Eric; Richard Socher; Christopher D. Manning, and Andrew Y. Ng. 2012. Improving word representations via global context and multiple word prototypes. *Proceedings of ACL*, 873–882.