

Entity Grid Model

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UIC CS 421

Entity Grid Model

- Alternative way to capture entity-based coherence
- Uses machine learning to **induce patterns of entity mentioning** that make a discourse more coherent
- Based on an **entity grid**
 - 2d array representing the **distribution of entity mentions across sentences**
 - Rows = sentences
 - Columns = discourse entities
 - Values in cells = Whether the entity appears in the sentence, and its grammatical role (subject, object, neither, or absent)

	Natalie	UIC	class	NLP
S1				
S2				
S3				
S4				

Example: Entity Grid Model

- [Natalie]_s was an assistant professor at [UIC]_x.
- [Natalie]_s taught a [class]_o at [UIC]_x called Natural Language Processing.
- [Natalie]_s enjoyed teaching the [class]_x, because [Natalie]_s liked [NLP]_o a lot.
- [Natalie]_s was planning to teach the [class]_x once per year.

	Natalie	UIC	class	NLP
S1	S	X	-	-
S2				
S3				
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S1	S	X	-	-
S2	S	X	O	-
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Entity Grid Model

- Dense columns indicate entities mentioned often
- Sparse columns indicate entities mentioned rarely
- Coherence is thus measured by patterns of **local entity transition**
- Each transition ends up with a probability

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S1	S	X	-	-
S2	S	X	O	-
S3	S	-	X	O
S4	S	-	X	-

{X, X, -, -}

Example: Entity Grid Model

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S1	S	X	-	-
S2	S	X	O	-
S3	S	-	X	O
S4	S	-	X	-

Example: Entity Grid Model

$\{x, x, -, -\}$

$$p(\{x, x, -, -\}) = \frac{1}{4}$$

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S1	S	X	-	-
S2	S	X	O	-
S3	S	-	X	O
S4	S	-	X	-

Example: Entity Grid Model

{-, o}

$$p(\{-, o\}) = \frac{2}{12} = \frac{1}{6}$$



Entity Grid Model

- These transitions and their probabilities can be used as features for a machine learning model, trained to predict coherence scores
- These models can be trained in a **self-supervised** manner:
 - Learn to distinguish the natural order of sentences in a discourse (expected to be coherent) from a modified order (e.g., randomized order)