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# Refining Information Extraction Through Unsupervised Cross-document Inference

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**NIGHTINGALE**



# Information Extraction and Its Role in GALE Distillation

**Barry Diller** on Wednesday quit as chief of **Vivendi Universal Entertainment**.

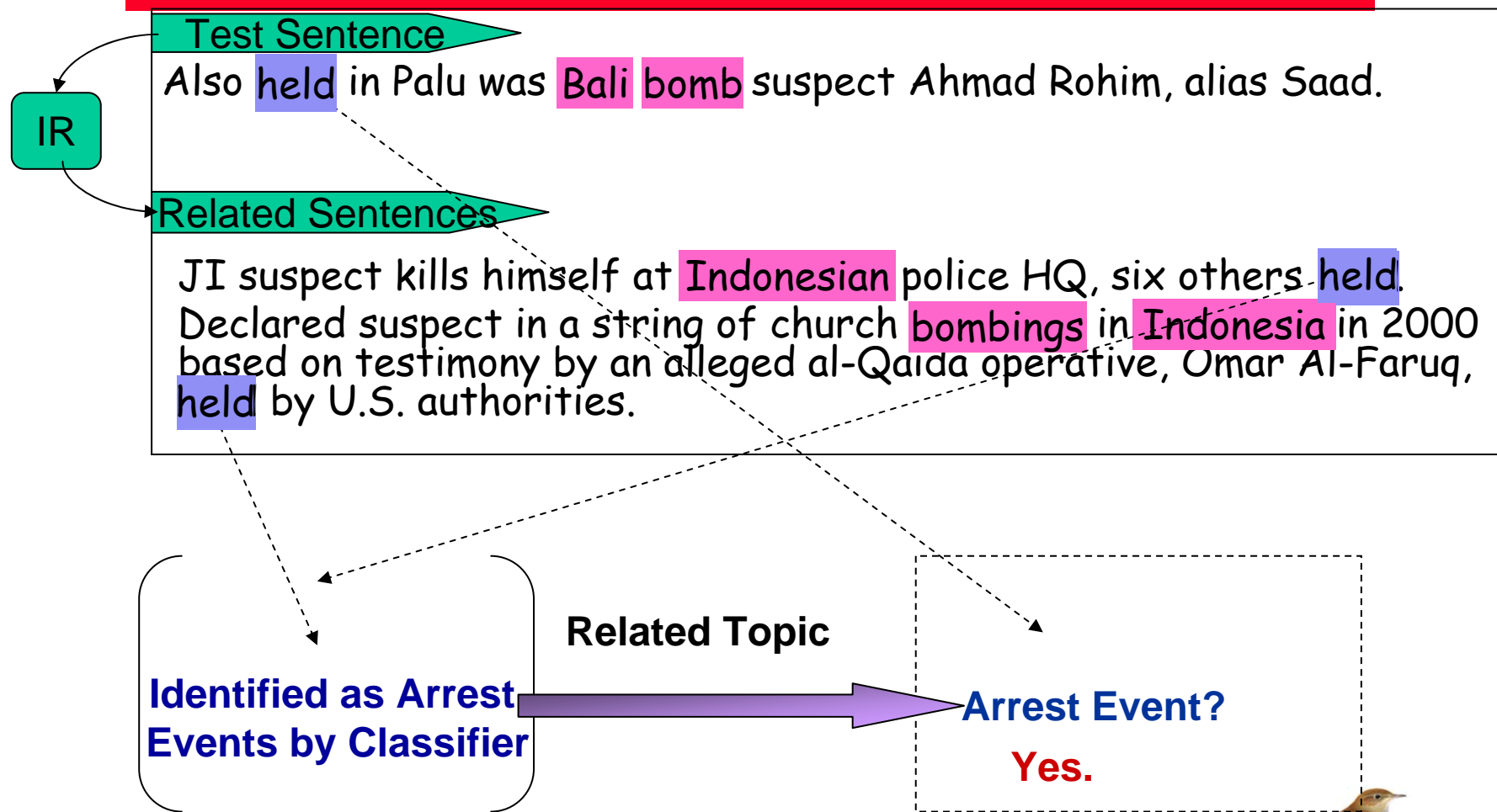
<b>Trigger</b>	Quit (a "Personnel/End-Position" event)	
<b>Arguments</b>	Role = Person	Barry Diller
	Role = Organization	Vivendi Universal Entertainment
	Role = Position	Chief
	Role = Time-within	Wednesday

- 33 different types of ACE events
- 12%-52% improvement for mono-lingual GALE question answering (Schiffman et al., HLT07; Hakkani-Tür et al., Interspeech07; Levit et al., ASRU07)
- 12.7% improvement for cross-lingual GALE document retrieval (Hakkani-Tür et al., RANLP07)



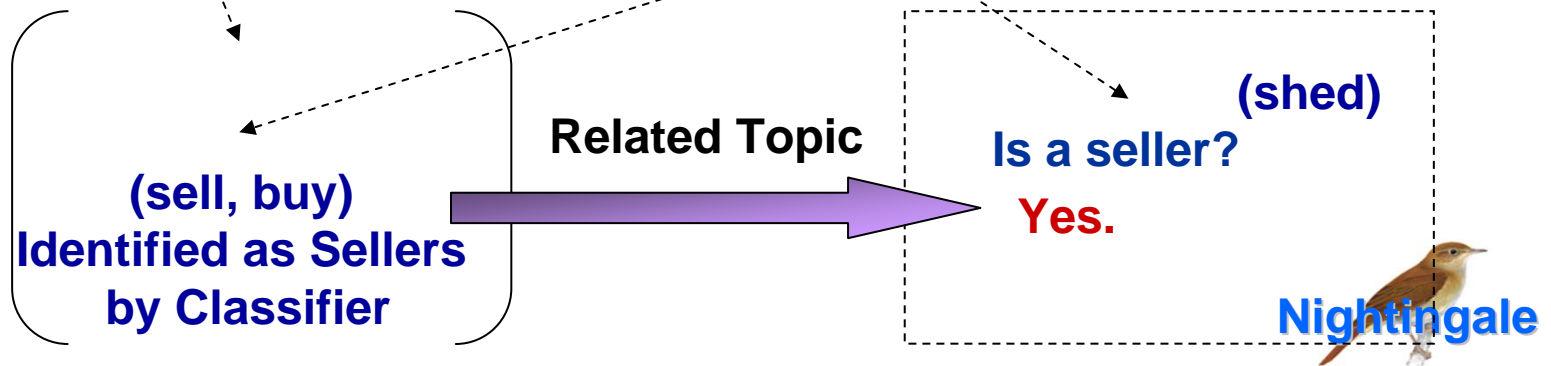


# One Trigger Sense Per Cluster



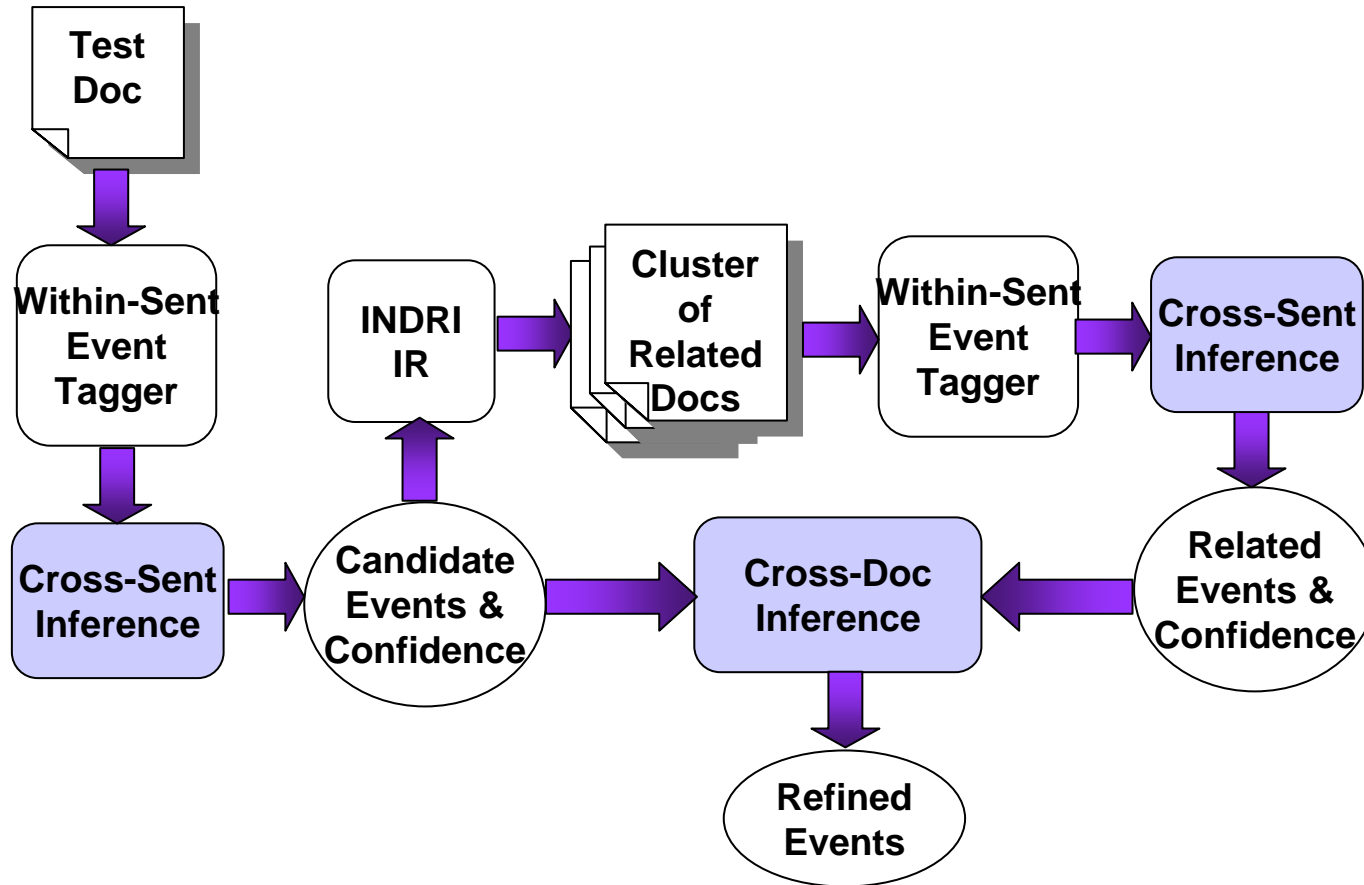


# One Argument Role Per Cluster





# Cross-Sent/Cross-Doc Event Inference Architecture





# Cross-Sent/Cross-doc Event Inference

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- Within-Sentence IE system produces local confidence
- Document-wide and Cluster-wide Confidence
  - Frequency weighted by local confidence
  - Count frequency of trigger with a particular event type
  - For each argument and its coreferred names, count frequency of event type
  - For each argument and its coreferred names, count frequency of event type and role
- Inference Actions
  - Remove triggers and arguments with low local or global confidence
  - Adjust trigger and argument identification and classification to achieve global consistency





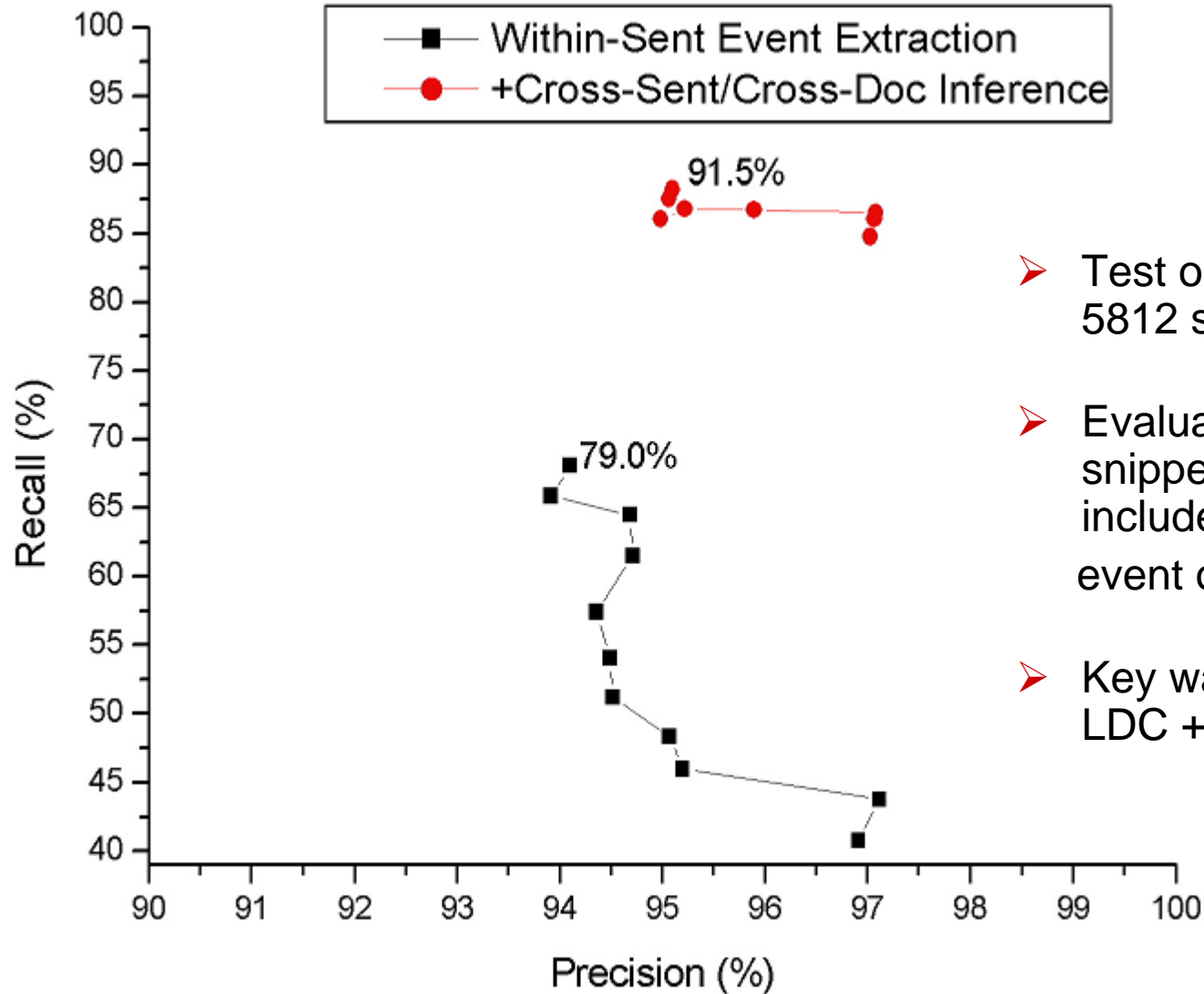
# Experiments: ACE Event Extraction

- Training from 500 English ACE 05 texts, test on 40 texts
- For each test text, retrieved 25 related texts from TDT5
- Confidence thresholds optimized based on dev set
- Performance (Ji and Grishman, ACL08)

Performance System/Human	Trigger Labeling			Argument Labeling		
	P	R	F	P	R	F
Within-Sent IE	67.6	53.5	59.7	41.2	32.9	36.3
After Cross-Sent Inference	64.3	59.4	61.8	49.2	34.7	40.7
After Cross-Doc Inference	60.2	76.4	67.3	51.3	36.4	42.6
Human Annotator 1	59.2	59.4	59.3	51.6	59.5	55.3
Human Annotator 2	69.2	75.0	72.0	54.1	73.7	62.4



# Experiments: GALE "Arrest" Template



➤ Test on 17 Y1 queries, 5812 snippets

➤ Evaluate whether a snippet sentence includes an arrest event or not

➤ Key was created by LDC + post corrections

