Comparing Complex Concepts with Transformers

Matching Patent Claims Against Natural Language Text

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Goal

- Semantic search for documents that contain all features of a patent claim

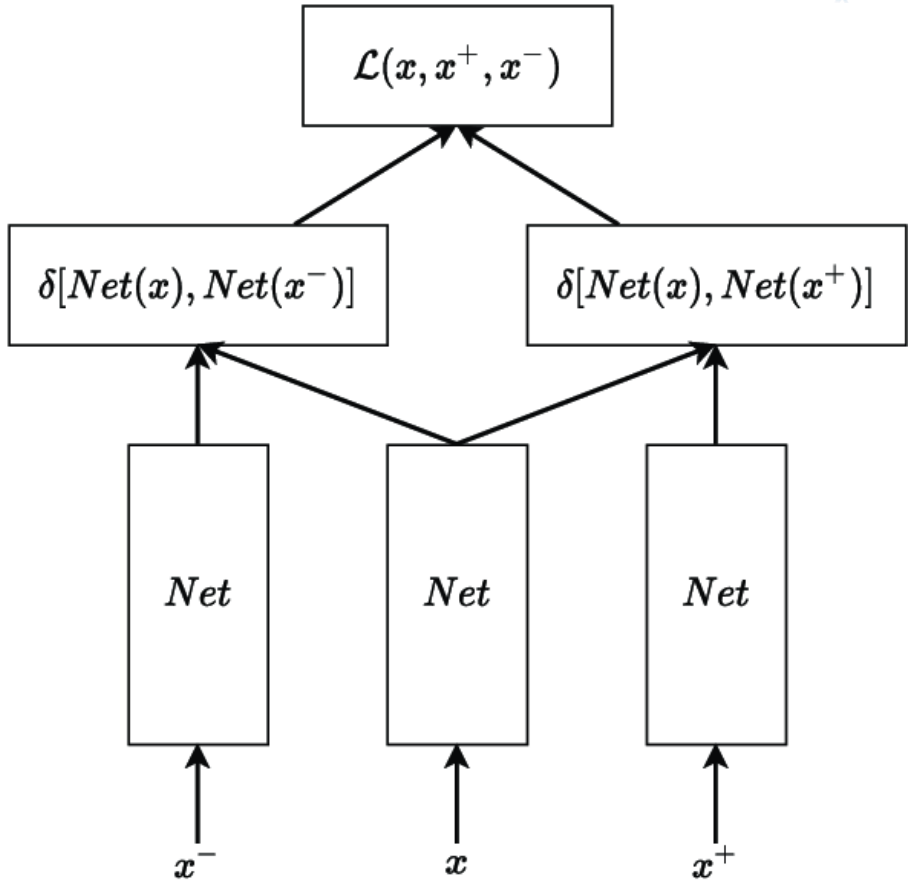
Data

- EPO *Search Report* ground truth data
- "X" document negates the novelty of the claimed invention
- "*A*" document is a relevant prior art that *does not* negate the novelty
- Each citation references the relevant passages

Method	X/A	X/Random
PatentMatch 2021	54%	
SearchFormer 2023	53.85%	98.04%
IP Rally 2021	58%	

Custom LLM Approaches

- Contrastive learning with triplet loss, cos( )
  - Claim, cited X, cited A
  - Claim, cited A, random X
- Training chunks contain multiple paragraphs
- Inference:
  - max(chunk-claim)
  - Aggregate paragraph-element



Method	X/A	X/Random
Max Chunk-Claim CCX	63.05%	99.61%
Weighted Paragraph-Element CCX	60.46%	

Figure © Elena Pirogova CC BY

Just Ask GPT 4o

Method	X/A	X/Random
GPT 4o internal data only	52.75%	
GPT 4o upload full text	59.17%	

- Eloquent, overconfident
- Chooses first item 66% of the time
- Not “rational”
- Language ≠ thinking

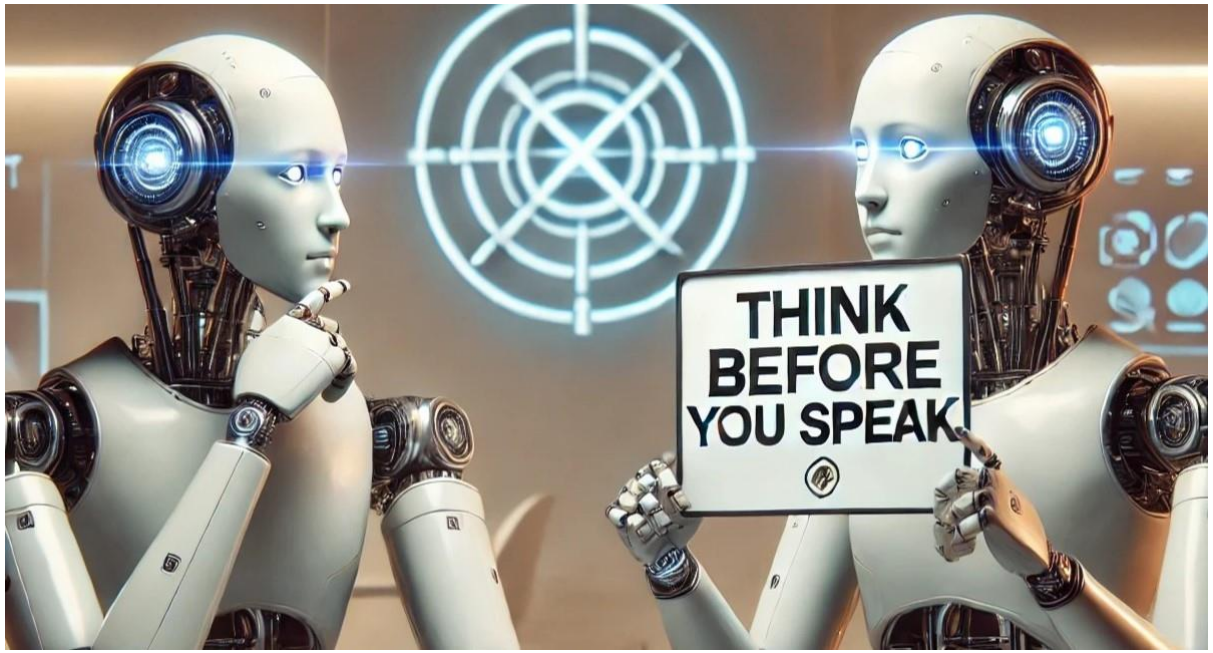


Image generated using DALL-E 3

Conclusions

- Real-time semantic IP search across millions of documents is practical
- LLMs don't think
- Eager to collaborate!

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A mobile phone system, comprising w=0.077
a Bluetooth radio frequency transceiver w=0.154
a cellular wireless transceiver w=0.231
a global positioning system device configured to automatically determine a global location of the mobile phone system w=0.308
a graphic display w=0.385
at least one automated processor configured to w=0.462
control the Bluetooth radio frequency transceiver to automatically directly receive at least an identifier of an adjacent mobile
wireless communication device w=0.538
automatically generate a record of the received identifier, along with a time and the global location of the mobile phone system
automatically determined by the global positioning system device w=0.615
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Priority Date: 2008-07-29 Keyword: bluetooth nFine: 100 Result #: 1 Submit

Result #	1
Document Score	1.303
Document #	US20020184418
Application #	09/867,907
Application Date	2001-05-30
Title	Location mapping and determining using wireless devices

Info	Feature	Text
1 Description 0.701	A mobile phone system, comprising	Base Station, Computer, Printer, Cell Phone, Mobile Device, PDA, unknown, etc.
2 Claims 0.816	a Bluetooth radio frequency transceiver	The system of claim 18 , wherein the wireless device includes a Bluetooth transceiver.
3 Claims 0.687	a cellular wireless transceiver	The system of claim 18 , wherein the wireless device includes a Bluetooth transceiver.
4 Abstract 0.781	a global positioning system device configured to automatically determine a global location of the mobile phone system	A system and method for providing location mapping and location determining is disclosed. The system and method use known location of other nearby devices to determine the location of a mobile wireless device.
5 BriefFig 0.554	a graphic display	FIG. 1 is a front elevation view of a handheld computer;