DataSys 2024 & ComputationWorld 2024

Theme

AI-based Computation Technologies - Benefices and Warnings

Moderator

Dr. Steve Chan, VTIRL,VT/I-PAC, USA

Panelists

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Introduction

-For which areas do we trust and are willing to rely upon AI; how about for our medical diagnosis?

-Do we have to be on the guard for implausible AI-spawned information or "hallucinations?"

-Should AI Energy Consumption (Training, Fine-tuning, Inferencing) be more transparent and readily available?

-Is the current AI paradigm more of a help or a hassle? Is it worth all the resources required?

▪ YOUR POSITION

- ▪ PRO's: **AI** may be used in scientific environments, as well as in technical environments, for automated, massive tasks, with minimal integration with human, but after training, thus reducing analysis time in several instances

- ▪ CON's: **AI** may be used in medical reporting, e.g. for CAT image analyses, but can we rely on it ?

- ▪ **Doubt:** how can humans profitably interact with AI engines? Will humans always have the last word?
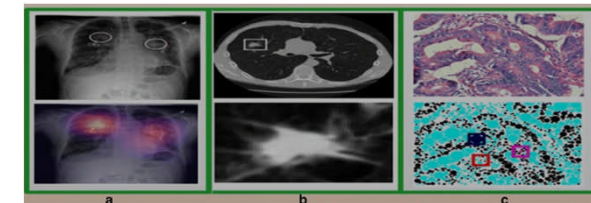
Guido Russo, University Federico II, Naples, Italy

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- **"Hallucinations" of Large Language Models in AI**
  - LLMs are known to generate seemingly plausible outputs that are factually inaccurate or misleading---limiting their applications in medical, engineering, and legal fields

An example
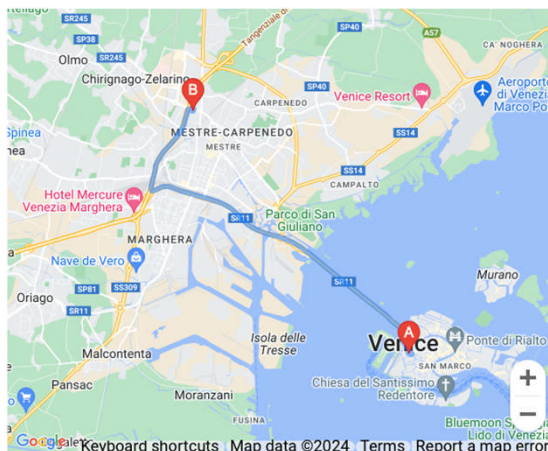
Walk ~1 km per minute!

Henry Chu
University of Louisiana
at Lafayette, U.S.A.

Strategies to address the "hallucinations" of Large Language Models in AI

- Prioritize reliable, well-curated, and factually consistent training datasets
- Link an LLM to a Knowledge Graph so that the LLM can verify its generated responses against a structured knowledge base, reducing factual errors
- Integrate automatic fact-checking modules to flag potentially incorrect statements before they are delivered to the user
- Output a confidence score along with a response can help users filter out potentially unreliable responses

- Uncertainty quantification of LLMs
  - Among several techniques (attention-based shift analysis, knowledge-aware methods), calibration and ensembling are promising solutions
    - Ensembling: train multiple variations of an LLM or run the same LLM multiple times with different initializations or input variations. If they agree on an output, it is likely to be correct, whereas disagreement signals uncertainty
    - Calibration: uses a logistic regression model to map the LLM's raw logits to calibrated confidence scores (probabilities) that better reflect true accuracy (Platt scaling); needs training data with labeled confidence scores, which can be expensive and subjective to create
  - How can uncertainty quantification techniques dynamically adjust to the context of the task? An LLM generating creative text vs. summarizing a medical history demands different confidence thresholds
  - Can calibration methods not only adjust confidence but also explain why the LLM is confident or uncertain?
  - How does the incorporation of knowledge bases (Wikidata, domain-specific ontologies) influence traditional calibration approaches? Are new methods needed?

Henry Chu
University of Louisiana
at Lafayette, U.S.A.

XAI Plus: The Need for AEC Figures

Steve Chan

- Is there an ongoing AI Training/Inference Inversion Paradigm happening?

  - While the Explainable AI (XAI) or Explainable ML (XML) movement has focused upon more explainable ML models, the AI Energy Consumption (AEC) facet has not progressed as rapidly and still remains fairly translucent. Should more emphasis be placed on this thematic when evaluating ML models?

  - Perhaps, the AEC for the various steps of the ML model life cycle needs to be better understood, as this will provide a more accurate AEC delineation for a deployed model, particularly when it is expected that high accuracy is desired; after all, an increase in Forward Passes (FPs) – an inference or posit/prediction per time interval – segues to higher AECs. Can an emphasis on AEC, perhaps, lead to more pragmatic AEC-cognizant ML models that are better suited for real world applications?

Panelist Position

- **Computation and resource aspects related to AI-based technology**

- **Validating Input data (Data Quality, Taxonomies, Ontologies, ?MetaData)**
    - Data Quality (trustability)
    - Taxonomies/Ontologies
    - Domain coverage

- **Extra-efforts on Myriads of ad hoc LLMs**
    - Private LLMs
    - Dedicated LLMs (domain-oriented)
    - LLMs mismatching (interoperability costs)

- **Doubtful output (more resources)**
    - Hallucinations (filling the gap)
    - Overfitting
    - Underfitting
    - Unintended consequences (re-validate the output)

- **Resources spending on AI-driven Digital Hassle**
    - Digital pollution
    - Wasting resources

Petre Dini
IARIA

Wasting time, energy, and resources

Everyday hassle (**legit** and **spam** - either marketing or phishing)
- Evaluate your expertise
- Your monthly statement, a few times a day, confirm your appointment (scheduled in 3 months)
- Unanswered messages
- Unrelated reply by chat-bots
- Donotreply emails

Petre Dini
IARIA

Interactive hassle
- Feedback on Google maps while driving, 'are you looking for a restaurant in this area?')
- Do you see a bump? Push here! What else can you report?
- *Delivery trust in question (USPS, mail, email delivery; assumption vs reality, verifying trusted senders, list of 'first-time)*

Social Media hassle
- I suggest you enter, Experience this (Skype)
- "You have 4 new invitations,: "Petre, you're getting noticed", "You have 1 new invitation" (LinkedIn)
- "Petre, people are reading your work" ResearchGate...
- AA: "Finish planning your upcoming trip to Venice!", hotels, cars, ... then, its partners "You have a trip", then...
- noreply: Take a quiz "At the office, do you have lunch at a restaurant or take home a package?"

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Thank you to the audience

and to the conference organizers!

Thank you to all the Panelists!

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