What is the state of the art generative AI in HEOR and RWE?

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Agenda

01 Introductions

Dr Ben Bray, Evidence Generation Lead, LCP Health Analytics,

Dr Stephen Duffield, Associate Director for Real-World Evidence Methods, NICE,

Emma Clifton Brown, Head of Health and Value, Pfizer UK

02 Practical applications of genAI in RWE and HEOR - Dr Ben Bray

03 Artificial Intelligence at NICE: what's the plan – Dr Stephen Duffield

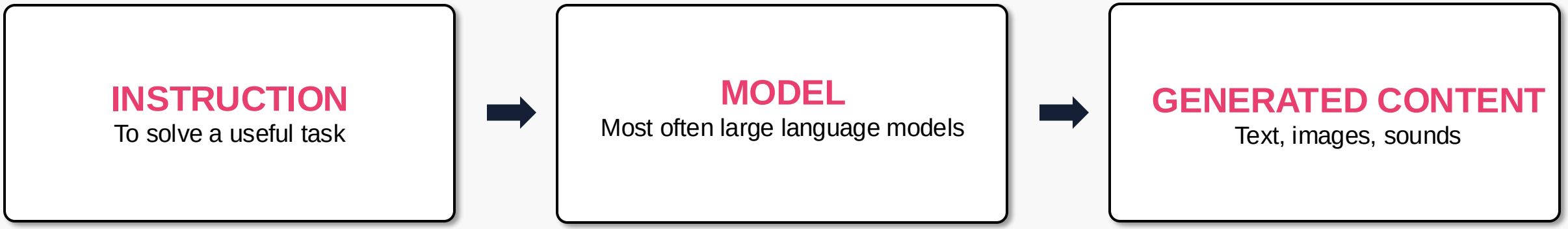
04 Industry perspective Q&A – Emma Clifton-Brown

05 Audience Q&A

Disclosures

I am a partner at Lane Clark and Peacock LLP

The explosion in AI capabilities has been driven by developments in generative AI



What is a Language Model?

A language model is a machine learning model that aims to predict and generate plausible language.

These models predict how likely a word or group of words is to appear in a longer sequence of words.

When I hear rain on my roof, I _____ in my kitchen.

cook soup 9.4%
warm up a kettle 5.2%
cower 3.6%
nap 2.5%
relax 2.2% ...

Generative AI is becoming capable of automating many workflows in RWE and HEOR

LCP powering possibility

LITERATURE REVIEWS

RWD GENERATION

QUALITY CONTROL

PROGRAMMING

DOSSIER WRITING

VALUE COMMUNICATIONS

LLMs approach human levels of capabilities for some but not all steps in literature review

Abstract screening is more accurate for SLRs of RCTs than observational studies[1]

LLMs are useful for some of the most manual tasks in SLRs

- Search strategy
- Abstract screening
- Full text quality assessment
- Data extraction from text and tables
- Data extraction from images
- Synthesising and writing

1. *Zdorovtsova et al, ISPOR Europe 2024*

Programming is a prime opportunity for automating with generative AI

NEWS

Alphabet results reveal extent of AI-powered programming

The parent company of Google is using its Gemini generative artificial intelligence tool to code a quarter of new software development initiatives

PharmacoEconomics - Open (2024) 8:191–203
https://doi.org/10.1007/s41669-024-00477-8

ORIGINAL RESEARCH ARTICLE

Artificial Intelligence to Automate Health Economic Modelling: A Case Study to Evaluate the Potential Application of Large Language Models

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Abstract

Background Current generation large language models (LLMs) such as Generative Pre-Trained Transformer 4 (GPT-4) have achieved human-level performance on many tasks including the generation of computer code based on textual input. This study aimed to assess whether GPT-4 could be used to automatically programme two published health economic analyses.

Methods The two analyses were partitioned survival models evaluating interventions in non-small cell lung cancer (NSCLC) and renal cell carcinoma (RCC). We developed prompts which instructed GPT-4 to programme the NSCLC and RCC models in R, and which provided descriptions of each model's methods, assumptions and parameter values. The results of the generated scripts were compared to the published values from the original, human-programmed models. The models were replicated 15 times to capture variability in GPT-4's output.

Results GPT-4 fully replicated the NSCLC model with high accuracy: 100% (15/15) of the artificial intelligence (AI)-generated NSCLC models were error-free or contained a single minor error, and 93% (14/15) were completely error-free. GPT-4 closely replicated the RCC model, although human intervention was required to simplify an element of the model design (one of the model's fifteen input calculations) because it used too many sequential steps to be implemented in a single prompt. With this simplification, 87% (13/15) of the AI-generated RCC models were error-free or contained a single minor error, and 60% (9/15) were completely error-free. Error-free model scripts replicated the published incremental cost-effectiveness ratios to within 1%.

Conclusion This study provides a promising indication that GPT-4 can have practical applications in the automation of health economic model construction. Potential benefits include accelerated model development timelines and reduced costs of development. Further research is necessary to explore the generalisability of LLM-based automation across a larger sample of models.

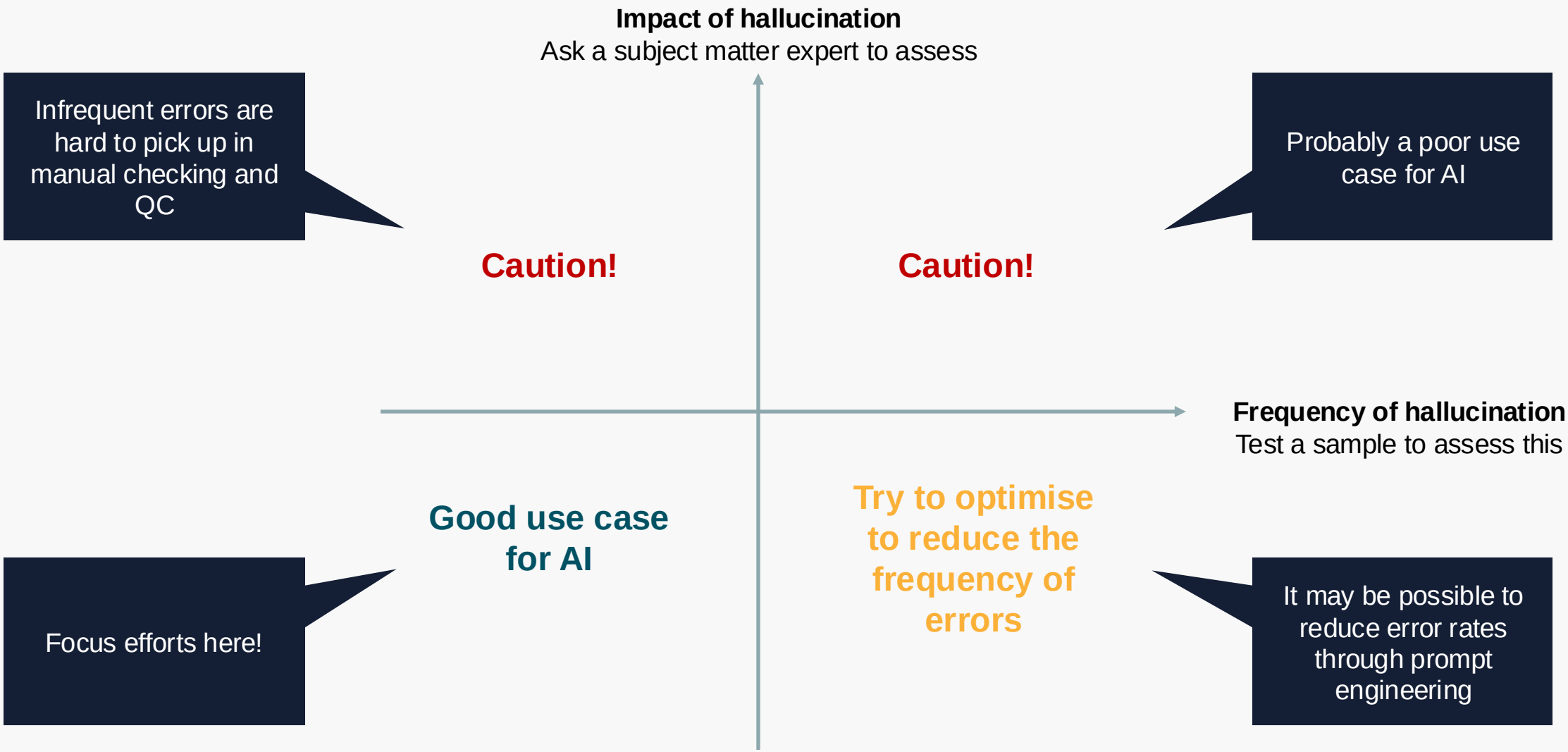
AUTOMATING RWE GENERATION

Rapid progress being made in automating programming of RWE studies

The most powerful LLMs have excellent code writing abilities (e.g. in Python and R)

Watch this space!

Use a risk-based approach for managing AI hallucinations



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We aim to lead the transition of health systems from importers of illness to exporters of health through realigning value between patients, manufacturers of medicines and payers.

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