



Budget \$tory

Addressing **Toronto's Budget** mess with **AI**

Have you ever encountered someone hosting a budget party to commemorate their successful budgeting efforts? I certainly haven't. As for complaints, there's certainly no shortage of those. However, that narrative is on the brink of transformation with the integration of AI into finance, exemplified by the likes of BloombergGPT.

Budget \$tory

It's not just Toronto; cities, countries, businesses, and households worldwide are grappling with budgetary challenges. Even those in relatively stable positions can't afford to take budgeting lightly because **relying solely on past trends for projections won't suffice** in times of economic uncertainty.



Examining Toronto's budget, questions like why an increase in property taxes, and cancelation of capital projects such as housing, transit, and climate action should ideally be answerable from a budgeting perspective with clear and well-founded reasoning. However, the reality is that these are **complex issues with no simple solutions.**

Can AI bring any relief?

Absolutely, the use of Large Language Models (LLMs) like ChatGPT and BloombergGPT can extend beyond providing relief and assistance.

When strategically applied, they have the potential to revolutionize various fields, much like how spreadsheets transformed finance by processing numbers to derive intelligent insights and reasoning.

LLMs can process and generate text at scale, enabling them to perform tasks such as text summarization, language translation, content generation, and even **answering complex questions**. This capability can be harnessed across industries, from healthcare to legal services, customer support, content creation, and beyond. By leveraging the power of LLMs, organizations and professionals can streamline processes, make informed decisions, and gain valuable insights from vast amounts of text data.



In essence, just as spreadsheets brought efficiency and intelligence to number crunching in finance, LLMs have the potential to bring similar **transformative benefits to the world of text and language processing across diverse domains.**



AI in Finance

In March, Bloomberg published a research paper that delves into the development of BloombergGPT, a novel large-scale generative artificial intelligence (AI) model. This particular model, known as a large language model (LLM), was meticulously trained on an extensive dataset of financial information, equipping it to excel in a broad spectrum of natural language processing (NLP) tasks.

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**Introducing BloombergGPT,
Bloomberg's 50-billion
parameter large language
model, purpose-built from
scratch for finance**

March 30, 2023

*BloombergGPT outperforms similarly-
sized open models on financial NLP
tasks by significant margins – without
sacrificing performance on general
LLM benchmarks*

<https://www.bloomberg.com/company/press/bloomberggpt-50-billion-parameter-llm-tuned-finance/>



What is LLM

Some of you might be wondering, **what exactly is an LLM** (Large Language Model) and how it relates to budgeting or any other topic. Let's picture it this way: Imagine there's a magical ocean with many ships sailing on it. Each ship is like a unique library, and each library contains a wealth of knowledge in the form of books.



In this ocean, there's one extraordinary ship that houses all kinds of general knowledge. Think of it as a massive book filled with information about almost everything you could ever want to know about the world.



Now, imagine an individual, someone brimming with curiosity, who decides to board this general knowledge ship. As they spend time on this ship, they learn a wide range of fascinating facts and insights about numerous subjects. They become like explorers, eager to soak up knowledge from all corners.



However, this individual's quest for knowledge doesn't stop there. In the distance, they spot other ships, each carrying books that delve deep into specific topics. There's a ship entirely devoted to animals, another dedicated to space, and even one focused on money and finance. Our curious individual decides to hop from one ship to another, exploring each area of knowledge.



Every time they board a new ship, they become an expert in that particular subject because they read and absorb all the books related to it. Now, imagine this individual as ChatGPT when they're done exploring the general knowledge ship and as BloombergGPT when they've thoroughly investigated the ship dedicated to finance. The transformation happens because they've acquired deep knowledge in those specific areas.



So, when we talk about a 'Large Language Model,' we're essentially referring to these virtual explorers. They have the **remarkable ability to comprehend and generate human-like text**, making them invaluable for extracting, understanding, and **applying knowledge from various domains**, including topics like budgeting and finance.



With that understanding let's turn our attention to The City of Toronto, where it is getting ready to reveal its budget, and unfortunately, it seems like there's not-so-great news in store for its residents. It looks like the people living in the city will have to deal with a bunch of not-so-pleasant updates and information.



Toronto's incoming mayor will be greeted with an anticipated budget shortfall of nearly \$50 billion over the next decade, with no clear solution in sight. This sobering reality was reported by The Globe and Mail last June.



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Toronto's next mayor will inherit large budget shortfalls and no clear way to plug them

DUSTIN COOK >
TORONTO
PUBLISHED JUNE 12, 2023



<https://www.theglobeandmail.com/canada/article-torontos-next-mayor-will-inherit-large-budget-shortfalls-and-no-clear/>

While much of the news for Toronto may seem negative, there is a silver lining. The current challenges and uncertainties call for innovative approaches to decision-making, especially in the realm of budget decisions. One such innovative approach is the utilization of Artificial Intelligence (AI).



What can AI provide?

Leveraging AI to advance the city's budget processes and enable Toronto citizens to make more informed decisions is undoubtedly a complex endeavor. However, the groundwork for such an undertaking has already begun elsewhere.

For example, Rutgers University has joined forces with the Government Finance Officers Association (GFOA) to extract financial data, enabling the application of natural language processing in financial planning.





Photo: Wrightstudio | Dreamstime.com



Project uses AI to extract local government financial data

19 June 2023

by Sarah Wray

A joint project between the Government Finance Officers Association (GFOA) and Rutgers University is using artificial intelligence (AI) to extract financial data more easily from local government financial reports.

<https://www.theglobeandmail.com/canada/article-torontos-next-mayor-will-inherit-large-budget-shortfalls-and-no-clear/>

These advancements pave the way for what was once hard to imagine—citizen participation in the budgeting process becomes a feasible reality. The ability to access information and obtain answers to questions becomes increasingly critical in this context.



Consider, for instance, the realm of citizen safety and policing in Toronto. The city comprises diverse regions, each with distinct demands influenced by its ever-evolving socioeconomic composition. Comprehending the intricate dynamics of these regions can indeed be an immensely complex endeavor.



Add to it the programs that are in place for its betterment, where citizen participation is crucial, not only in taking part but also in having a hand in its governance, which in turn influences the budgeting decisions.

Traditionally, budgets have often been driven by prevailing trends, with data, reports, and analytics serving as significant factors influencing decision-making. AI, owing to its cognitive capabilities and natural language processing prowess, is poised to not only **introduce novel budgeting methods** but also to enhance governance across a multitude of dimensions.



What difference will AI make?

Whether it involves budgeting for a household, a community organization, a public entity, or a business of any scale, AI is poised to play a substantial role. This will materialize as leadership in these domains comprehends the significance of natural language processing queries and recognizes the potential of AI, particularly in the form of large language models, **when adequately invested in.**

Contrary to conventional practices, these investments can be undertaken by multiple entities, with the greater good taking precedence over competition. Consider, for example, the initiatives undertaken by Bloomberg in this domain, and the valuable insights that can be gleaned from the experiences shared by its Head of Machine Learning, David Rosenberg, in an AI Podcast hosted by Sam Charrington.





<https://youtu.be/byCe7-c84d4?si=7h2HiWe1IAGPjwuY>

TorontoGPT or Not?

The question that arises is whether Toronto can evolve into a city where every taxpayer dollar spent is demonstrably dedicated to the welfare of its citizens. Could Toronto potentially develop its own AI model, perhaps called TorontoGPT?

Toronto has earned a reputation for its thriving tech scene, notably in the realm of artificial intelligence. Therefore, it seems only fitting that the city should take the lead in embracing innovative approaches. Furthermore, Toronto can collaborate with similar initiatives occurring globally.



The word 'Toronto' holds a special meaning—it means 'plenty' in the Huron language. Who knows, one day, with the advent of Large Language Models, Toronto's budget might become an incredible story.



It could be a tale of how innovative technology transformed the way decisions were made and resources were managed, ultimately leading to the city's growth and prosperity. The future is filled with exciting possibilities, and **AI and language models may play a pivotal role in creating inspiring narratives in various fields**, including budget management.

