

De-Blackboxing AI Technology using AI for Student Understanding



PROBLEM OF PRACTICE

Despite the rapid advancements in AI technology and its integration into various fields, there is a significant gap in the educational system's ability to keep pace with these changes. This disconnect results in graduates who are well-versed in AI questioning why the broader public and industry professionals are surprised by current AI capabilities.



ICTC  **CTIC**

 **Factors**

District: ICTC and Factors Education

Province: Ontario

Date: November 2024

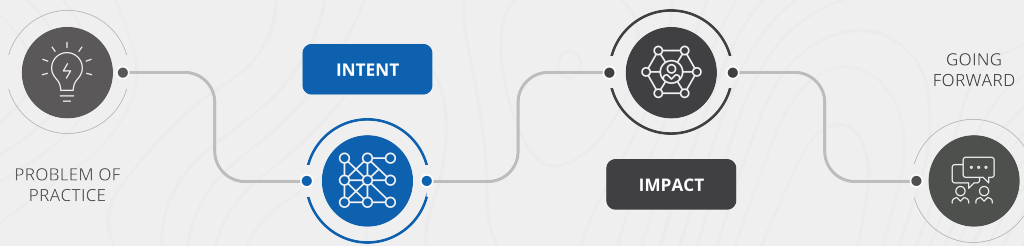
Lead: Tim King, WIL Digital eLearning Facilitator, ICTC

Aman Sahota, Co-Founder, Factors

Henry Fu, Co-Founder, Factors

De-Blackboxing AI Technology using AI for Student Understanding. ICTC and Factors Education

Integrating AI in Education: Transforming Learning — An AI Use Case Initiative for Canadian Education
<https://c21canada.org/ai-use-case-initiative/> © 2024 C21 Canada. All Rights Reserved.



Intent

The intent of this use case is to demystify AI technology for students by providing transparency into how it works using AI technology itself. Addressing this gap is essential to ensure that educational practices and curricula are aligned with technological advancements, preparing students effectively for the evolving job market and societal needs.

The goal was to unpack AI by creating a configurable AI engine from scratch, rather than using a pre-packaged product. We envisioned an AI system that could explain AI to students in a chatbot format, making the learning process interactive and transparent. This approach required significant human effort, emphasizing that building AI involves iterative testing and experimentation, contrary to the belief that AI simply replaces human jobs.

Our AI, created by Factors, is designed to work with selected data sets, focusing on specific tasks rather than using vast, generalized data. This focus enhances credibility, privacy, and student safety. By delving into the mechanics of AI in an understandable way, we aimed to demystify the technology, allowing it to explain itself to students effectively.

The Factors AI system incorporates three new libraries focusing on:

1. The history of AI (developed by Aman)
2. The mechanics of AI (developed by Henry)
3. The future of AI (developed by Tim)

These libraries will be used to build and test the system's context-building capabilities. Additionally, three interactive activities will be available within the system for students to explore and learn AI concepts.

We are working at the cutting edge of artificial intelligence with this project. Using a custom-built AI engine designed to respond to student inputs from limited training datasets, the Factors system typically analyzes sentiment in natural language when asking staff and students about their school environment. In this case, we tested the limitations of the Factors AI system by having it learn datasets on:

- The history of AI
- How AI works
- The future of AI

The AI then interacts with students, prompting them to ask questions about each of these subjects. In short, this is AI explaining how it works to humans.

// Imagine having Socrates prompting you, which is exactly what happened in the Academy, a very long time ago. Now it's a machine doing it, and the machine has all the time in the world for you.

//
—Tim King
WIL Digital eLearning
Facilitator, ICTC



Impact

AI had a profound impact on the use case. The only non-AI component was the human-student interaction; everything else involved large language models learning their own history, technical details, and future insights. The Factors AI engine was leveraged to create an interactive experience for students. While arranging the modules was straightforward, fine-tuning the AI engine, especially with a focus on student safety, was complex. Researching credible, detailed data to feed the system and testing it with multiple library entries was time-consuming and challenging within the project's limited timeframe.

Data was collected from about 70 students, and the Factors engine analyzed human sentiment in their interactions. This dual data collection—both sentiment and interaction data—provided deep insights, which is exciting from an educational perspective. One key finding was that students found AI less intimidating after working with it, though anxiety levels were still notable. This indicates that while students may not be entirely comfortable with AI, they are becoming more familiar with it. It was great to see **hope** as one of the primary data sets coming out of out of the student responses with these Chatbots.

Professional Learning insights

Tim, Aman, and Henry have effectively demonstrated through this project that AI can be a powerful and purposeful tool for helping students learn complex topics. AI itself can be challenging to explain, making it difficult for teachers to support a classroom full of students in understanding its workings and societal benefits. However, the concept of learning with the help of AI can be applied across various subject areas.

Individualized Learning Experiences: One of the key takeaways for educators and administrators from this case study is AI's ability to provide individualized learning experiences. Each student's interaction with the AI model is unique, tailored to their personal interests and prior knowledge. This customization can significantly benefit students who require different levels of support, making learning more accessible and effective.

Emotional Assessment: AI systems' ability to assess a student's emotional response during interactions is a crucial aspect often overlooked in traditional assessments. Understanding a student's emotional connection to the topic and their overall feelings about the learning experience can provide deeper insights into student engagement. This information can help teachers tailor future instruction to better meet student needs and enhance engagement.

Challenges and Commitment: Implementing AI in education is not a quick and easy solution. As highlighted by Tim's final evaluation, creating these AI systems can be time-consuming, especially for teachers new to the technology. However, the benefits of using AI in the classroom can far outweigh the initial barriers.

The process of learning, understanding, and implementing AI is an investment, but the reward of seeing students succeed with their studies makes it worthwhile. These insights underscore the potential of AI to transform educational practices by providing personalized, emotionally aware, and supportive learning experiences, despite the initial challenges involved in its implementation.

Going Forward

GOING
FORWARD



Building AI systems is a human-intensive, iterative process, which posed challenges within the limited timeframe of this research project. During the AI-student interactions, the AI discussed its potential in various sectors, such as retail, and encouraged students to consider other job areas that might be impacted. In a business class context, some discussions also explored entrepreneurial opportunities, particularly in investment and finance.

Each conversation was personalized based on student responses, a task that would be nearly impossible for an educator to manage individually. The AI's ability to handle these personalized interactions significantly lightened the educator's workload.

Looking ahead, we plan to leverage this AI system for ICTC's national cyber day in November. This event will expand our data collection from around 70 student responses to potentially 2,000. The insights gained from this larger dataset are expected to be remarkable, building on the foundational work of this project.



<https://c21canada.org/ai-use-case-initiative/> © 2024 C21 Canada. All Rights Reserved. Dell and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners.