

Optimizing Business Processes with Customized AI Solutions



C3 AI delivers a comprehensive enterprise AI application development platform and a large and growing family of turnkey enterprise AI applications.

Location: Global

Use Cases: Process Optimization

Website: www.c3.ai

Results

- 1.9% estimated increase to annual yield
- \$8MM+ potential economic value when deployed at scale

C3 AI Process Optimization, powered by Gurobi, delivers an estimated 1.9% annual yield increase for C3 AI's client—representing over \$8 million in potential annual economic value when deployed at scale.

As the leading enterprise AI software provider, C3 AI empowers organizations around the world to accelerate their digital transformation journeys with scalable, secure, and reliable applications that leverage the latest advances in machine learning and artificial intelligence.

With the C3 AI Platform, organizations can rapidly develop, deploy, and operate AI applications to optimize their business processes, enhance user experience, improve operational efficiency, and reduce costs.

C3 AI boasts over 90 out-of-the-box applications that are ready to be deployed for customers. Many C3 AI applications, including C3 AI Process Optimization, leverage mathematical optimization to deliver insights that drive substantial business value across a range of industries.

Helping Customers Optimize Their Business Processes

Many C3 AI customers across oil and gas, chemicals, and manufacturing face complex business challenges that require them to balance multiple objectives, constraints, and uncertainties.

As Brett Stewart, AI Solutions Director at C3 AI, explains, "Many of our customers have a model—let's say it's forecasting, or something similar. The next thing we need to figure out is how to make optimal decisions given that model."

For example, customers may be looking to maximize yield, improve product quality, or reduce energy consumption by optimizing the way they allocate resources or schedule certain activities.

To help customers solve these optimization problems, C3 AI leverages mathematical optimization and machine learning. In one project, they helped a fertilizer producer maximize both the quantity and quality of steam generated, as well as the efficiency of its turbogenerators.

"That particular project likely could have been done without an optimization solver, because that's a bit of a simpler use case," recalls Suman Tripathy, Lead Data Scientist at C3 AI. "But as we broadened our scope and expanded the number of assets we were trying to optimize within one formulation, it would have been pretty much impossible for us to do some kind of simulation-based optimization approach."

Having experimented with Gurobi's optimization solver for some of their

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Suman Tripathy

Lead Data Scientist, C3 AI



other applications, C3 AI knew that the solver could support their wide range of use cases and decided to adopt it for the C3 AI Process Optimization application.

Using AI-Powered Decision-Making to Maximize Yield

When it comes to optimizing their processes, many of C3 AI's customers are looking to increase efficiency and maximize their output. This was the case for a sugar manufacturer, which processes sugar cane through various unit operations until it becomes the final product, raw sugar.

The client's production process involves a sequential chain of steps in which different types of machinery are used to crush and wash the cane, extract and refine the juice, and so on. Each machine can be set to specific operating points for speed, torque, temperature, or pressure. Adjusting these points impacts the overall output quality and quantity. In addition, process variables such as water, lime, or acid amounts need to be considered.

The main challenge for this client was to find the optimal combination of setpoints and variables that would maximize sugar yield while satisfying various constraints, such as equipment capacity, energy consumption, environmental regulations, and product specifications. This was a complex optimization problem that required a powerful and flexible solver that could handle nonlinear and mixed-integer models.

"Basically, the ultimate goal is to increase the sugar that's created from the whole system, because even just a 1% increase in sugar yield can mean millions of dollars for these companies," explains Tripathy.

Using Gurobi and their client's existing yield model, C3 AI was able to provide their customer with an automated, data-driven solution.

"One of the successes that we've seen with Gurobi is that we're able to seamlessly pass live data—unified on the C3 AI Platform from across disparate enterprise source systems—and use that data in real time as numerical inputs to optimization models," Tripathy shares. "Then, Gurobi can help us determine



the maximal sugar output based on the current sensor data."

Sweet Results: Reducing Costs and Boosting Efficiency

After deploying C3 AI Process Optimization powered by Gurobi, the sugar manufacturer can increase annual sugar yield by an estimated 1.9%. This improvement translates to over \$8 million in potential annual economic value when deployed at scale.

But the optimized solutions have led to more than just an increase in output. As Stewart explains, "In addition to the yield improvements, we saw cost savings from reduced chemical usage, and we're also giving [the manufacturer] some flexibility in the way they produce energy, because they use a byproduct of the cane production as the fuel source for their steam. We've helped them reduce costs and also improve their energy usage."

When it comes to doing the actual optimization work with Gurobi, the C3 AI team enjoys a smooth user experience with guidance from an expert support team.

"Gurobi has integrated very well with our tech stack, and the onboarding process has also been quite easy for new users. I was never really exposed to any of this before, but the Gurobi tutorials are so

simple and make it easy to learn," says Tripathy. "And the customer service has been so refreshing. If we put in a very complex question, even when the question is unclear, they'll help us find the solution."

She adds, "I honestly think [Gurobi] is super fun. It's just so cool to see how it works and all the different things you can do. I think anyone could benefit from it and have fun experimenting."

Experience Gurobi for Yourself

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- Free model tuning services
- Free access to our world-class technical guidance and support
- Two free hours of one-on-one consulting services

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