

Innovating Without Hallucinating: Making AI Your Partner in Creativity

Judy Rady (Virginia Tech)
David Townsend (Virginia Tech)

KEYWORDS: Entrepreneurship, AI, How to grow your business.

The rapid advancement of generative AI (GenAI) tools like ChatGPT, DALL-E, and others represents an exciting new frontier for enhancing human creativity. As these technologies gain capabilities once thought to be exclusively within the domain of human ingenuity, interest has exploded around how GenAI can be used to ideate and develop new entrepreneurial opportunities. Equipped with the ability to process vast amounts of data and generate new connections, GenAI offers immense potential for entrepreneurs to automate and augment creative processes, [especially to develop new and innovative venture ideas](https://eiexchange.com/content/Generative-AI-Can-help-grow-your-business) (<https://eiexchange.com/content/Generative-AI-Can-help-grow-your-business>), which were previously manual, labor-intensive, and constrained by cognitive limitations.

However, while much optimism surrounds GenAI as a catalyzing force for entrepreneurial creativity, these technologies also suffer from a phenomenon known as "algorithmic hallucinations." In short, algorithmic hallucinations refer to instances where GenAI generates ideas or content that appear coherent, realistic, meaningful, and doable only on the surface but upon further inspection are realized to be illogical and irrelevant to the real-world applications. Therefore, with all the promises creative AI tools offer, without proper oversight and assessment, pursuing opportunities predicated on these hallucinatory outputs can lead entrepreneurs down time- and cost-intensive dead ends.

This article aims to provide entrepreneurs with practical guidance on effectively leveraging the immense creative potential of GenAI while simultaneously avoiding the pitfalls of algorithmic hallucinations. We summarize key insights from cutting-edge academic research and translate them into actionable recommendations that entrepreneurs can implement when employing GenAI

within their opportunity ideation processes.

How Algorithmic Hallucinations Can Mislead Entrepreneurs

The phenomenon of algorithmic hallucinations appears when GenAI tools develop outputs that are deceptively reasonable and conceivable, but in actuality turn out to be distorted, unrealistic, and nonviable. When GenAI tool ChatGPT-4 itself was asked what algorithmic hallucinations are, it stated that algorithmic hallucinations involve producing "outputs that appear logically coherent but are based on flawed or misunderstood data patterns, deceptively mimicking reasonable insights."

This phenomenon can be particularly perilous when GenAI is used by entrepreneurs since they could be misguided and misled by confident and sensible-sounding venture ideas that have no relevance to real-world applications. For example, intergalactic space resorts have long captured the attention of science fiction writers and enthusiasts. While there are multiple space entrepreneurship ventures working to turn these sci-fi dreams into reality, implementing such an idea relies on technologies, materials, rocket propulsion capabilities, and an enabling regulatory infrastructure that are still under development. In a sense, a GenAI system hallucinating space hotels might be relying on infrastructure and conditions that are currently not feasible given limitations in present technologies and markets. Unbridled creativity without acknowledging the constraints that may limit the feasibility of an idea is the breeding ground for algorithmic hallucinations.

As entrepreneurs look to creatively utilize GenAI tools in their opportunity ideation processes, a core challenge lies in effectively differentiating ideas that are truly groundbreaking yet implementable value-creating



opportunities from flights of fancy disconnected from market realities. Therefore, entrepreneurs are still required to assess and evaluate these GenAI-generated ideas to effectively overcome problems attributed to algorithmic hallucinations.

Sources of Algorithmic Hallucinations

Before diving into idea assessment, it is useful for entrepreneurs to understand common sources that may account for algorithmic hallucinations in the first place. Two primary factors contribute to GenAI's tendency to creatively hallucinate:

1. Algorithmic Temperature Settings
2. Prompt Engineering

Let's explore each factor:

Algorithmic Temperature Settings

GenAI tools rely on certain parameters that regulate the degree of randomness and creativity manifested in their outputs. A prominent example is "temperature" settings - with higher temperatures leading to more random, unconstrained creativity. Lower temperatures constrain outputs more closely to the original input data.

Cranking up temperature settings to maximize novelty is tempting for entrepreneurs seeking breakthrough innovations. However, excessive randomness contributes heavily to logically disjointed, market-irrelevant hallucinations. Finding the right balance between constrained repetition of existing knowledge and unbridled novelty is imperative.

Prompt Engineering

Equally important is how entrepreneurs frame and structure the text prompts provided as inputs to GenAI tools. Prompts guide and constrain the search space for outputs, similar to providing a thesis statement before writing an essay. Highly ambiguous, vague, or terse prompts increase degrees of freedom and randomness, again raising risks of hallucinatory outputs.

By engineering prompts to provide sufficient grounding context around elements like industry, target market, available resources, and goals, entrepreneurs can steer GenAI creativity toward more useful directions and reduce hallucination risks.

In summary, hallucinations often arise from combinations of excessive creativity temperature settings and insufficiently constrained prompt engineering. With this foundation, let's now explore how entrepreneurs can judiciously assess imaginative outputs from GenAI to catch unrealistic hallucinations while still capturing creative, valuable new opportunity concepts.



Assessing Algorithmic Creativity versus Hallucinations

A crucial insight from research for entrepreneurs utilizing GenAI for ideation is that creativity is not the only factor that matters in business venturing! For an entrepreneurial idea to manifest in reality, human-led entrepreneurial work must ensue to translate creative inspiration into implemented deliverables producing value. This translation process invariably involves grounding imaginative ideas in market realities and overcoming assumptions that remain rooted in fantasy versus achievability.

Therefore, when interpreting and assessing the outputs of GenAI tools, a critical role exists for human judgment to determine whether AI has hallucinated by creatively meandering outside the bounds of what can attainably be implemented at a given time and place.

It might be useful for entrepreneurs to ask the following questions either to themselves, team, family or even their GenAI tool itself.

1. Does the idea make sense and why?
2. Is the language used by the tools too abstract, vague, or confusing? How clear and concrete is the GenAI-generated idea?
3. What are the data that support this idea? What

is the source of the data?

4. How can it be effectively implemented? Do I have the capacity, capabilities, and resources to pursue it? If not, would a larger, more resourceful organization be able to pursue it? Or, how could I access the necessary resources to turn this idea into a real venture?
5. What would I think, or how would I react to the idea if a fellow entrepreneur proposed it?
6. Does it fulfill existing needs? How would the market react to it? How would I feel as a customer about it?

By asking these questions critically, entrepreneurs will not completely eliminate the risk of falling for algorithmic hallucinations completely, but such critical thinking gives them time to overcome the initial excitement around a creative idea and to critically assess potential opportunities that stem from the GenAI recommendations.

Let's explore how entrepreneurs can leverage human judgment and expertise to evaluate artificial creativity by enhancing some of their own skills.

Industry Knowledge

No matter who the entrepreneur consults with or what tools they use, they must also work on enriching the industry knowledge to be able to leverage their knowledge to evaluate and assess a recommended idea in a given industry. Therefore, when prompting, the entrepreneur can specify the industry they are most knowledgeable of so that they can effectively analyze the idea independent of the tools.

AI Knowledge

Entrepreneurs may need to familiarize themselves with various AI tools and capabilities to see which one aligns best with their own skills. When entrepreneurs understand that the basic output from GenAI tools such as ChatGPT is not necessarily directly analyzing data (i.e., calculate the demand for a product), entrepreneurs can recognize that the recommended opportunity is simply a creative possibility but not necessarily a viable opportunity. In addition, even if an entrepreneur prompts the system to analyze data user input directly, it is important for entrepreneurs to validate the recommendations directly by analyzing the data.

In some cases, entrepreneurs can ask the system to analyze and critique its own recommendations, but it is

still critical for entrepreneurs to validate and confirm all of the recommendations. These systems are also characterized by a 'jagged edge' in terms of performance – very good in some areas but very limited in other areas.

We don't really know why these systems can produce such uneven performance, but it is clear that the performance of the system is influenced by its training data and so it will not always be clear whether the system is producing viable recommendations or not. When entrepreneurs are educated about the limitations of GenAI tools, not only will they be able to ask the right questions to inspect potentials for algorithmic hallucinations, they will also be able to leverage each AI tool for the right task.

Technical Knowledge

Industry knowledge can help understand whether GenAI tools are on the right track with trends and demand -- i.e., more sustainable, eco-friendly directions. However, entrepreneurs are still required to understand different technical facets of a product within an industry. For example, recently ChatGPT-4 recommended the development of "Biodegradable Air Purifying spheres," which would be developed through a unique blend of natural microorganisms and plants and would operate without electricity. As an entrepreneur, I would need the specialized knowledge and know-how to understand whether this idea is realistic as opposed to being novel and have a deeper understanding about the required materials that would optimize the uncommon blend.

Practical Recommendations

Based on the entrepreneur's significant role in identifying and surmising potentials for algorithmic hallucinations, here are eight practical recommendations entrepreneurs can implement when working to ideate new ventures powered by AI:

1. Understand that you can control some factors of the GenAI outputs, but **you don't have complete control over the training data** if you are using commercial platforms. With greater levels of AI knowledge and experimentation, entrepreneurs will be more aware of the tools' limitations and foibles.
2. **Introduce yourself and get to know your GenAI tools.** Similar to getting to know an assistant or a business partner, you and your GenAI tool need to get acclimated to each other.

The more you describe the business interests and the resources you have in your prompt, the more relevant the idea would be to your background, making it easier to assess. Similarly, the more you interact with your GenAI tools, the more you will be able to understand their strengths and weaknesses under different settings.

3. Experiment with different GenAI tools.

While ChatGPT-4 is one of the most popular ones, there are others including Bing, DeepAI, Eden AI and others. **Find the right tool** that produces the right balance of creativity and applicability for your business.

4. Do not be afraid to set high temperature levels! While the outputs of high temperature settings can be daunting it can also be a great inspiration. Although some would suggest using conservative GenAI temperature settings to prioritize coherence and precision over uncontrolled novelty, **low temperature settings can be unnecessarily constraining.**

Hence, entrepreneurs can even test the same idea under different temperature settings to find the idea that is more creative, appealing, and applicable all at the same time.

5. Like humans, GenAI tools need clear directions for precision and optimal outputs. Entrepreneurs are still their own bosses in the age of AI. Therefore, they can structure prompts to provide targeted context on industry, market, resources, and goals so AI creativity manifests within relevant bounds.

6. Remember, many Gen AI tools like ChatGPT are designed as conversational platforms. Continuously press GenAI for clarifications, elaborations, or even to challenge and critique its own recommendations. For example, ask it to detail implementation plans, substantiate quantitative claims, address feasibility concerns, and qualify speculative language. In addition, ask the tool to provide a critique of its own idea, and it can surprisingly be informative and helpful in assessing the idea. One effective way to think about GenAI tools is as a conversation partner -- an incredibly smart and creative brainstorming partner – who can help you brainstorm new ideas or even rethink existing ideas.

7. Maintain healthy skepticism. For example, watch out for abstract projections, growth

analogies, and imaginative metaphorical language that lacks evidentiary grounding. In a sense – be inspired, but always verify!

8. Do not blindly follow an AI recommendation. Use your judgment as the ultimate arbiter to decisively determine if GenAI outputs represent viable opportunities, or if they are veering into hallucinatory territory.

Concluding Thoughts

The bottom line is that while GenAI represents an invaluable tool to augment entrepreneurial creativity, prudent steps must be taken to avoid falling prey to seductive but unrealistic hallucinations. By calibrating GenAI temperature and prompt settings and by using their own judgment to judiciously and critically evaluate imaginative outputs, entrepreneurs can harness algorithmic creativity to generate new venture opportunities that represent breakthroughs that are still implementable. In this sense, rather than displace human creativity outright, this balanced approach allows AI and human ingenuity to combine forces in powerful ways to spark revolutionary innovation, while still creating tangible value in ways that are aligned with human values and market realities.

Learn More

EIX's [October 2023](https://eiexchange.com/issues/99) [issue](https://eiexchange.com/issues/99) (<https://eiexchange.com/issues/99>) focused on the promise and peril of AI.