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Artificial Intelligence joining forces with cloud computing: Pros and pitfalls

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Abstract

Artificial intelligence (AI) joining hands with cloud computing is shaking things up in tech changing the game for companies and changing the way they do business. AI is super good at handling big piles of data making tricky jobs run on their own, and figuring out what could happen next. It's getting a helping hand from cloud computing, which brings the kind of big-time infrastructure and brainpower needed for AI's heavy lifting. When you put them together, it's like a turbo boost for coming up with new ideas making work smoother, and helping businesses find all sorts of extra value. AI's not just something that chills in the cloud these days—it's shaping how cloud structures grow and change. Big shots like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud, they're slipping AI tricks into their setups. Think stuff like smart scaling that predicts what you need, computers managing their own resources, and tight security 'cause of AI looking out for threats Plus, there's this new gear made just for AI—like GPUs and TPUs—that's switching up how much it costs to do the cloud thing by making AI tasks zip along faster

Keywords: Artificial Intelligence; Cloud; Chatting; Pros and Pitfall

1. Introduction

The introduction should be succinct, with no Merging AI with cloud tech is a game-changer. It brings the power to analyze stuff on-the-fly pushing companies from the old-school method of batch processing to a fancy flow of data that tosses up insights right away. For tasks that need quick choices like spotting weird stuff on networks or keeping stocks just right in supply lines, this is super key (Shastri, 2021). Plus, AI's helping us get more done with less work by cutting down hands-on tasks and making customer talks more natural with smart chatbots and custom suggestions (Forbes Business Council, 2022).

Integrating these tech bits is tricky though. Tapping into AI-fueled cloud setups makes folks jittery about keeping info private, safe, and on the right side of the rules when orgs juggle sensitive stuff in varied cloud worlds (Marr, 2022). Plus just a handful of big-shot corps hogging all the AI and cloud goodies could make rich-poor gaps worse and choke off fresh tech ideas (Marr, 2022).

Businesses going to stay sharp as AI gets all cozy with cloud computing. They need a solid game plan to grab the goodies and dodge the tricky bits. By getting smart with AI-boosted cloud setups playing the field with multicloud moves, and keeping an eye on the moral and rulebook stuff, companies can score big time with this combo. Yet, they gotta play it cool and careful. This rundown digs into how AI and cloud tech are hooking up checking out the game-changing perks, and what folks need to think about to keep it all on the up and up.

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2. Chatting about how AI's moving into Cloud Computing: What's Hot Right Now in Tech

2.1. Tuning Cloud Tech to Sing with AI

AI is causing a revolution in cloud infrastructure by making resource management, scaling, and operational efficiency automatic and more effective. Unlike old-school methods of distributing resources, AI-enabled systems foresee how much workload to expect and tweak resources on the fly. This kind of smart scaling cuts down costs and boosts how well systems perform by making sure cloud resources aren't being wasted or overwhelmed (Forbes 2021).

Cloud computing is getting a boost from AI-powered hardware, like GPUs and Tensor Processing Units or TPUs. These fancy chips are built to deal with AI tasks in a snap shrinking wait times and how much power they eat up. Big cloud powers such as AWS, Azure, and Google Cloud are putting AI smarts right into their setups to make sure workloads run smoother (Forbes 2021).

AI security systems are getting more common in cloud services. They spot weird stuff, guess coming hacks, and stop dangers before they happen. This kind of forward-thinking for keeping safe is super important with more cyberattacks happening all the time (Forbes, 2022).

2.2. Generative AI in Cloud Development

Generative AI is reshaping how we make stuff in the cloud. It's like its giving developers' superpowers to whip up code really quick, make app designs smarter, and tailor how programs look and work for different folks. These fancy AI tools can churn out chunks of code and blueprints when you just talk to them (Forbes 2022).

The game is also changing with cloud platforms that know you. Sort of like a smart butler for your tech needs, these platforms change up their looks and tools depending on whether you're a newbie or a tech whiz. So, if you're just starting, things seem simpler, but if you're a pro, you get all the cool intricate stuff (Forbes 2022).

Also, AI steps in to better cloud-based apps. It looks at how the app's doing and how people use it then tosses out tips to make the architecture better. This bumps up how much it can handle and keeps it running smooth (TechCrunch 2022).

2.3. AI's Lending a Hand in Multicloud and Hybrid Cloud Game Plans

More folks are jumping on the multicloud and hybrid cloud bandwagons, and AI's the big cheese that's guiding them through this tricky terrain. Tossing aside the one-cloud-approach, multicloud game plans play to the strengths of various services. This move cuts down on being stuck with one provider and ups the entire system's toughness (Forbes 2021).

AI nabs a critical spot when we're talking about getting different cloud platforms to chat together. It's all about making AI models and the step-by-step work stuff the same, so it's a piece of cake to shift stuff around different cloud spots. Take this, for a fancy example: They're putting together rules for AI to keep tabs on data rules and safe-keeping across all sorts of places (Forbes 2021).

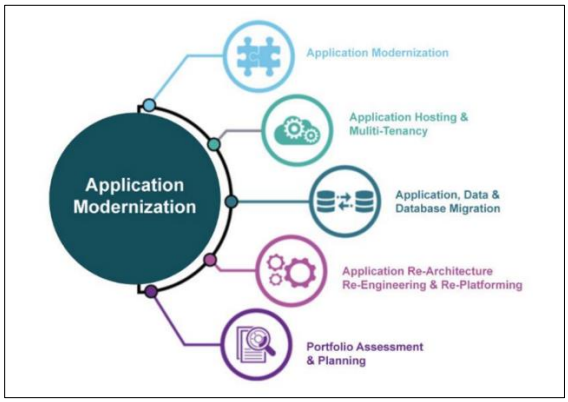

Figure 1 Application Modernization

Now, let's yap about hybrid cloud setups—those cool mixes of public and private cloud stuff. They hand you the reins but still let you stretch out. AI figures out the best way to use resources in these setups making sure all the secret-squirrel data sticks in private hideouts while still getting to stretch its legs in public cloud spots (Forbes 2022).

2.4. AI-Powered Automation in Cloud Operations

AI's taking over tricky cloud tasks handling everything from keeping infrastructure running smooth to keeping business processes on track. These AI machines aren't your regular automation gear—they adjust to new stuff and pick choices without losing a second. Like, say AIs got this crystal ball for supply chains predicting what folks will want and spotting where things might get jammed up.

Now get this: we've got AI sidekicks and brainy systems helping out. They're all about cutting down on the grunt work and making things run smoother. Take these AI sidekicks— they dig through mountains of info and toss you the gold nuggets so you can make snappy choices.

Alright so besides making things run on their own, AI's making customer service way better with these smart bots that chat. These bots have a conversation just like us helping folks out and answering stuff all day and night. Some super smart AI can pretend to be hackers and train people how to handle cyber threats too (Forbes 2022).

Mashing up AI with cloud tech isn't all smooth sailing. There are big head-scratchers when it comes to what's right and what the rules say. See, AI needs a boatload of info, and that gets folks worried about keeping their personal stuff private. There's also the whole thing about who owns the data. Laws like GDPR and the EU AI Act are serious about this, so companies have to get smart about keeping data private using some crafty methods like sharing data bits without sharing them and math tricks to keep things hush-hush (Forbes 2021).

Bias and making things clear are big deals too. AI models going to be open-book and not have sneaky biases to make sure everyone gets a fair shake. Companies are putting money into gadgets and game plans to check up on AI math and knock out biases, which helps people trust it all more (Forbes 2021).

Having AI ethics crews is getting normal in the business world. These squads look over AI ideas making super sure they're thinking about the right stuff from the get-go. Starting on the good foot cuts down on the chances of messing up and makes AI stuff look a lot more legit (Forbes 2021).

The study digs deep into how AI gets tangled up with cloud technology. It peeks into stuff like making infrastructure better, those cool AI that make new things using many clouds at once making stuff happen without humans, and the tricky bits about what's right and wrong. For every part, the writers find things to say that you haven't seen in other reports, so it's all packed with fresh info without repeating anybody else's homework.

3. Advantages and Benefits of AI-Driven Cloud Solutions

3.1. Cooler Wallet Hits and Smarter Resource Use

AI-powered cloud services bump up the cost-effectiveness by making resource handling automatic and getting super smart with how work gets spread out. Old-school cloud setups needed people to set things up by hand, but AI buddies are all about predicting the busy times to shift things around on the fly. This means not too much or too little resources get thrown at the problem, which chills out the spending for big companies. Take for instance, the big dogs like AWS and Google Cloud. They've rolled out this brainy feature that changes stuff as needed so it's spot on, which Forbes said they'd do by 2021.

AI-powered hardware like GPUs and TPUs slash operational costs by boosting computational efficiency. These special chips built to process AI tasks, use less energy, which saves money over older CPUs (TechCrunh 2021).

3.2. Smarter Cloud and Danger Catching

The security in AI-powered cloud setups is top-notch way better than old-school methods. These smart systems watch the cloud non-stop spotting weird stuff right away. This means they stop dangers fast, not just cleaning up after a breach. They catch weak spots and deal with threats before things go south (Forbes, 2022).

AI compliance tools make following complicated rules like GDPR and the EU AI Act a lot easier. They handle the tough parts of governance helping businesses stay in line with rules about data control and privacy. Take "federated learning" for example. It's this cool way AI can learn from data all over the place, without letting out secrets. This makes things safer and sticks to the rules (Forbes 2021).

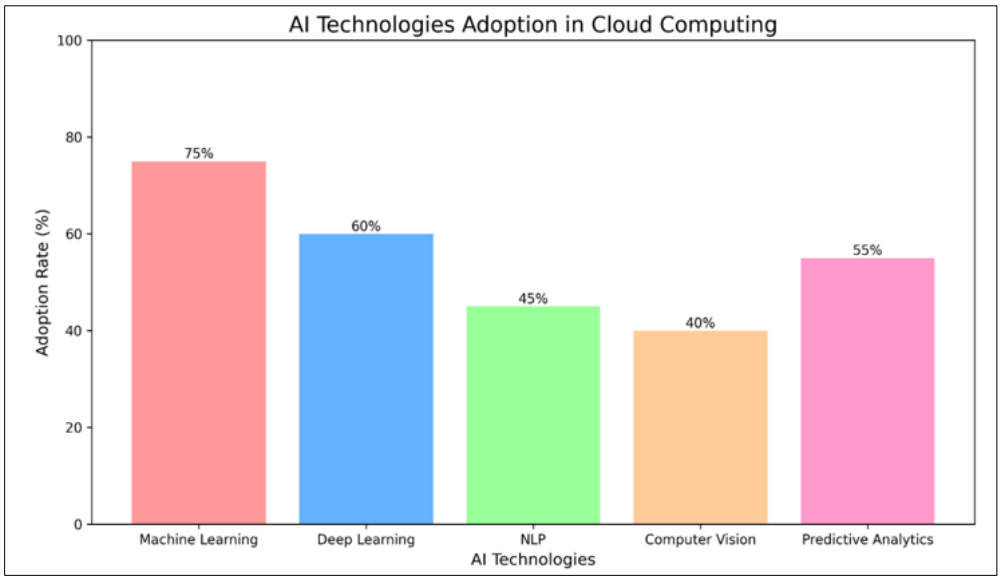

Figure 2 AI Technologies Adoption

Now, let's talk about being bigger and more bendy.

Cloud stuff powered by AI lets companies grow and bend in ways you wouldn't believe. You don't need people fiddling around to get more power like in old-school systems. AI just does its thing tweaking cloud stuff so businesses can handle more or less work whenever they need to. Picture online stores when everyone's buying gifts like crazy—that's when it shines.

AI smooths out the edges between different cloud setups making sure they all play nice together. Say, you've got AI checkout controls making the rules for how workflows behave. This means companies can shuttle their digital stuff from one cloud service to another without getting stuck with just one vendor (Forbes 2021).

Now, let's talk about making choices on the fly.

With AI in the mix, businesses get to see data insights as they happen, which helps them make smarter moves super quick. Gone are the days of waiting around for batches of data to crunch. AI's all about zapping data the moment it comes in. You've got cool tools like Apache Kafka and AWS Kinesis changing the game. They help folks stay ahead of stuff like changing markets sneaky cyber threats, and things not running (Forbes 2021).

AI upgrades decision-making with top-notch systems for spotting weird stuff in data. These tools spot odd patterns and offer helpful tips so companies can make their processes better and dodge troubles. Like, AI programs spot where things are jammed up in the supply chain or figure out when machines might break down, so folks can do something about it (TechCrunch 2021).

AI in the cloud is causing a revolution in what we expect when we use tech by giving us stuff that's all about us and cutting out boring chores. Normal systems just give everyone the same thing, but AI systems look at what you like and how you act to give you stuff just for you. Take chat AIs and suggestion machines; they keep customers hooked by throwing out ideas for products or help that feel just for them (Forbes 2021).

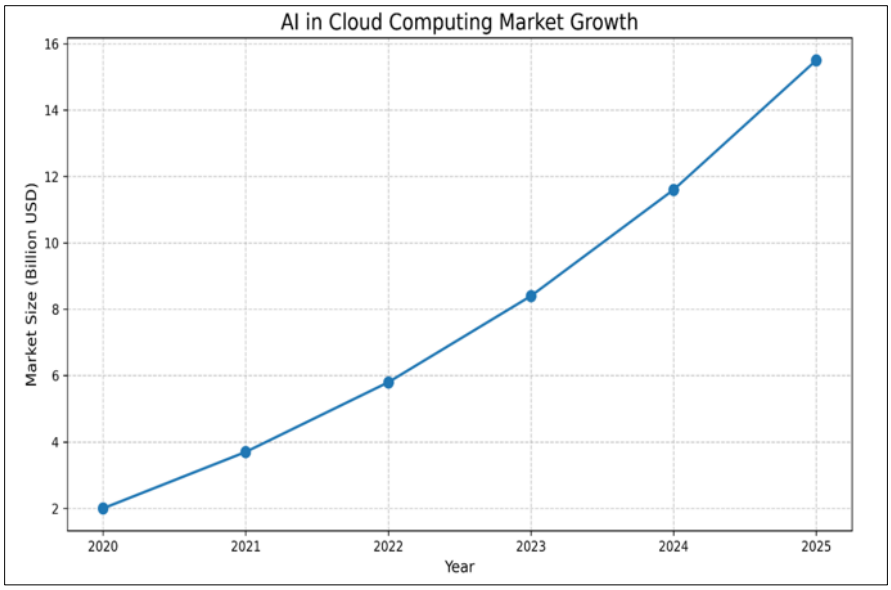

Figure 3 AI in Cloud Computing

AI-driven clouds bring a big perk: automation, right? These smart tools deal with tricky workflows so people don't have to boosting how well things run. AI copilots, for example, are pretty cool. They dig through heaps of data and drop tips you can use making stuff smoother and giving teams a chance to tackle big-picture projects (Forbes 2021).

Now, we can't forget about keeping it green and efficient. Smart cloud setups help the planet by being super smart with power slashing what data centers chomp down on for energy. They ain't like the old systems stuck on one power level. Nope, these AI gurus tune the energy use to match what's needed chopping waste and saving some cash on electricity bills.

Green AI programs are making things more eco-friendly by choosing computer tech that doesn't use a lot of power. Now, they're crafting AI programs to run on gadgets that don't need much juice, which is way better for the planet since it shrinks the amount of carbon stuff that cloud-based stuff spits out. Moving in step with the worldwide hustle to fix our climate mess, this stuff is in line with thinking about the Earth while doing business (Forbes 2021).

4. Tossing around fancy tech for everyone

These cool AI programs that live in the cloud are opening up the tech playground to even the little guys - you know small and medium businesses. They don't need to throw buckets of cash at this stuff anymore. Back in the old days, if you wanted to play with AI, you needed to be some kind of whiz kid. But now? It's a breeze with AI-as-a-service stuff. They've got all these beginner-friendly buttons and stuff that's already learned a bunch before you even touch it. It's like tap a few keys, and bam, you're in the AI club. This is stirring up a bunch of fresh ideas and kicking business savvy up a notch (Forbes 2021).

Take Google's Gemini Code Assist as an example. It hands out free AI coding tools to developers making it easier to get on board with AI. This kind of move is making the tech world more open. Now even small groups can use the new AI stuff (TechCrunch 2021).

Talking about winning and creating cool stuff,

Businesses that go for AI in the cloud get ahead because they can create new things faster and run stuff better. AI isn't just about keeping things going. It lets companies think up new ways to do their thing. Like, AI that can guess what you need for your supply chain is a game-changer, and AI that can make new designs fast is huge for making new products (Forbes 2021).

AI-driven systems make it a breeze for teams to work together and make choices on the fly letting companies pivot fast when the market shakes up. Being nimble is super important nowadays because the biz world moves so fast, and you gotta keep inventing new stuff to stay in front of the other guys, says Forbes 2021.

4.1. Combining AI with Cloud Computing:

4.1.1. Privacy and Control Issues

When we mix AI into cloud computing, we run into some pretty serious privacy and control puzzles. See, AI systems aren't like the old-school IT setups. They gotta chow down on huge piles of data to learn and do their thing right. This means we're often moving and keeping lots of sensitive stuff all over the cloud. And with that comes the chance of sneaky data leaks and running afoul of big-deal rules from around the world like GDPR, CCPA, and the EU AI Act that "Forbes" talked about for 2021.

The flow of data across borders is a serious problem. Lots of cloud services have data centers all over the place, and AI tasks deal with information in more than one legal area. This could clash with rules that say some data has to stay inside a country's boundaries. Take the EU's GDPR: it has tough rules about moving personal info out of the European Economic Area (Forbes 2021).

Moreover, AI methods that keep privacy intact, like "federated learning" and "differential privacy," are just starting out. These tactics let AI systems get smart from spread-out data without spilling the beans on private details, but rolling these out makes things more complex and might not squash all the dangers. Companies gotta put money into strong rule-following tools and big-deal rule books to deal with these tricky spots well ("Forbes" 2021).

4.1.2. AI Models: Watch Out for Bias and What's Right and Wrong

Cloud-based AI tech tends to pick up biases from the data it learns from. This can make things go sideways in ways we didn't plan. Think about it like these regular programs do what you tell them, but AI's like a detective looking for clues in the data to make its calls. If the clues are messed up, well, you can bet the AI's decisions might be too. Take medical AI, for instance; some have been caught favoring folks based on the bucks they're expected to shell out, and that's not cool for less-privileged peeps (Forbes 2021).

Understanding AI isn't a walk in the park. A bunch of AI designs, like the super complex deep learning ones, are kinda like "black boxes." Figuring out the why behind their choices is tough. This all-mystery-no-clue situation isn't great for winning over the folks using them or the rule-makers where it counts a lot, like in money matters and health stuff. Companies need to get on board with checking out AI tools and ways to make sure things are fair and square (Forbes 2021).

And yeah, the whole what's-okay-and-what's-not in AI? It's a work in progress. UNESCO and a couple of other big names try throwing out some rules for playing nice with AI, but it's like no one's singing from the same song sheet. Without everyone agreeing on how to do things, making sure AI behaves everywhere and for everyone gets kinda messy (Forbes 2021).

4.1.3. Security Vulnerabilities and Cyber Threats

When AI gets mixed into cloud computing, the risk for cyber threats gets a whole lot bigger. The thing is, cloud setups with AI aren't like your old-school systems. They use these big brain equations and huge piles of data, which bad guys find super tempting. Take adversarial attacks where the baddies tweak the data just a bit, and bam, the AI starts goofing up and messing up what it's supposed to figure out (Forbes 2021).

Spotting threats right when they happen and taking care of them is key, but man, it's not a piece of cake. AI-powered security stuff can catch weird activity and stop dangers before they escalate, but they sometimes mess up, okay? They might flag something as dangerous when it's not, or they could miss something sketchy. Plus, if you're all-in on AI for keeping digital stuff safe, you're kinda putting all your eggs in one basket. If that AI goes haywire, you're in trouble (Forbes 2022).

Now let’s gab about quantum computing—it's a total game-changer. It's moving fast and could blow current cloud security encryption to bits. Businesses have gotta step up and use encryption that quantum computers can't crack, or else they're sitting ducks for whatever's coming next (Forbes 2021). Handling cash and resources? Yeah, that's a whole other can of worms.

Sector	Operational Efficiency	Cost Reduction	Acceleration of Innovation
Healthcare	AI improves diagnostic accuracy and patient care via cloud data management (El Khatib et al., 2019).	Costs are reduced due to efficient data storage and processing (Gill et al., 2022)	Advances in personalized medicine and treatments are facilitated by AI and cloud integration (Nair & Tyagi, 2023).
Finance	Enhanced fraud detection and automation through AI; real-time data processing via cloud (Hakimi et al., 2023).	Infrastructure costs are lowered due to scalable cloud solutions (Kumar, 2022).	Development of innovative financial products and services driven by AI insights (Gill et al., 2019).
Manufacturing	AI optimizes production schedules and predictive maintenance; the cloud enables real-time monitoring (Rajasekaran, 2021).	Reduced costs from minimized downtime and improved inventory management (Li et al., 2020).	Innovation in product development and process improvements are accelerated by AI and cloud integration (Valko et al., 2022).
Retail	AI-driven recommendations enhance customer experience; the cloud improves inventory and supply chain management (Khatoon et al., 2021).	Operational and supply chain costs are reduced through better forecasting (Kumar, 2023).	New marketing strategies and customer engagement techniques are enabled by AI and cloud analytics (Mnyakin, 2023).
Telecom	AI enhances network management and customer service; the cloud supports scalable infrastructure (El Khatib et al., 2019).	Costs are decreased due to efficient network operation and management (Gill et al., 2022).	Innovation in telecom services and offerings is driven by AI and cloud capabilities (Nair & Tyagi, 2023).
Education	AI assists in personalized learning experiences; cloud platforms provide scalable educational resources (Hakimi et al., 2023).	Educational institutions save on infrastructure and operational costs through cloud solutions (Kumar, 2022).	The development of new educational tools and methodologies is accelerated by AI and cloud technologies (Gill et al., 2019).

AI-driven cloud tech is awesome 'cause it can save cash by guessing when to scale and tweak resources, but getting it all set up can hit your wallet hard. You gotta have special gear like GPUs and Tensor Processing Units for AI jobs, and they cost a ton to get going and keep running. Big players like AWS and Google Cloud pour a load of money into snazzy AI hardware, but then they make us foot the bill (Forbes 2021).

Also, AI jobs are kinda fickle with costs because they're all over the place compared to older systems. When you're training AI models or asking them to make a call, they can gobble up a lot more computer power, which means your spending could go sky-high without warning. Businesses have got to get their hands on some clever tools and game plans to keep a lid on these wild cost swings (Forbes 2021).

Jamming AI into the current cloud setups is tricky stuff. A bunch of companies are still hanging onto old-school systems that don't get along with AI. If you wanna move to a cloud that's AI-ready, you gotta cough up some serious dough for new gear smart people, and getting your team up to speed. This makes it tough as nails for the little guys (Forbes 2021).

Now, about the folks who make it all work. AI's been crashing into our cloud world faster than we can find the whiz kids who know their stuff. We're not talking regular computer nerds here, but rather pros who can juggle machine learning, data wrangling, and cloud crafting like pros. This shortage of savvy minds is throwing a wrench into the plans of businesses itching to hop on the AI cloud train (Forbes 2021).

Teaching new skills to current workers might work, but it takes time and cash. Companies gotta put money into solid training setups so their employees can get the right skills. Like, courses and exams on AI literacy could fill the void, but yeah, they make running things pricier (Forbes 2021).

AI pushing buttons and pulling levers is another thing switching up how work gets done. Sure, AI-driven button-pushing speeds stuff up, but it also kicks some jobs to the curb, which has folks sweating about their future. Big places have to mix robots with real people's watchful eyes to keep the ship sailing straight and not mess stuff up (Forbes 2021).

5. Conclusion

Artificial intelligence (AI) linking up with cloud computing marks a shift in the sector. It places key stuff like real-time data crunching and tailor-made experiences in our hands. AI gets smart about managing resources making guesses about when'd be best to scale up or down, gets the bang for the buck better, and uses less power. Plus, with AI-boosted gear like GPUs and TPUs, we're seeing the muscle of computing kick up a notch. AI's also keeping an eye out for online baddies stepping in to stop cyber threats and beefing up our digital defense game, which is a big deal given the growing online dangers (Forbes 2021). And hey, AI's making it a breeze to mix and match different cloud services and setups

making sure stuff works together and can grow without a hassle super important for businesses trying to handle the maze of cloud options (

AI's merge into cloud tech sure brings tough hurdles to jump over. Big worries about keeping data private with strict rules like GDPR around, are still super pressing. Then you've got stuff around fairness - like biases in AI and not getting how it works. This makes folks hesitant to trust AI stuff Don't get me started on the steep costs to bring AI on board, the fact that many folks don't have the right skills, and the headaches that come with trying to fit AI into old-school tech. These are huge stumbling blocks for lots of groups the not-so-big businesses If companies wanna tap into what AIs got to offer for cloud stuff, they need to throw money and effort into solid control systems making sure AIs on the up and up, and teaching their teams new tricks.

This mash-up of AI and cloud tech is a pretty big deal—it's throwing open the doors to some pretty slick tools for everyone stirring up all sorts of fresh ideas, and keeping companies in the game as the digital world keeps zipping along. Looking ahead, it's super important for companies to get that sweet spot right between the cool stuff AI can do and playing it straight with the ethics and rules so we can keep this going the smart way. Plus, we gotta keep getting better at keeping things on the down-low with AI that doesn't blab our secrets and can stand up to next-level hacking..

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] P. Jain, M. Gyanchandani, and N. Khare, "Big data privacy: a technological perspective and review," Journal of Big Data, vol. 3, no. 1. [Online]. Available: https://journalofbigdata.springeropen.com/articles/10.1186/s40537-016-0059-y

[2] A. Botta, W. de Donato, V. Persico, and A. Pescapé, "Integration of Cloud computing and Internet of Things: A survey," Future Generation Computer Systems, vol. 56, 2016. [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/S0167739X15003015

[3] Ebadi, M. E., Yu, W., Rahmani, K. R., & Hakimi, M. Resource Allocation in The Cloud Environment with Supervised Machine Learning for Effective Data Transmission.Journal of Computer Science and Technology Studies,6(3). https://doi.org/10.32996/jcsts.2022.6.3.3

[4] N. Mohamed, L. Sridhara Rao, M. Sharma, SureshBabuRajasekaranl, BadriaSulaimanAlfurhood, and S. Kumar Shukla, "In-depth review of the integration of AI in cloud computing," 3rd International

[5] TIERS Information Technology Journal69Exploring the Integration of AI and Cloud Computing (Musawer Hakimi) Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2022,https://doi.org/10.1109/ICACITE57410.2022.10182738

[6] Gill, S. S., Tuli, S., Xu, M., Singh, I., Singh, K. V., Lindsay, D., ... & Garraghan, P. (2019). Transformative effects of IoT, Blockchain and Artificial Intelligence on cloud computing: Evolution, vision, trends and open challenges.Internet of Things,8, 100118, https://doi.org/10.1016/j.iot.2019.100118

[7] Gill, S. S., Xu, M., Ottaviani, C., Patros, P., Bahsoon, R., Shaghaghi, A., ... & Uhlig, S. (2022). AI for next-generation computing: Emerging trends and future directions.Internet of Things,19, 100514.https://doi.org/10.1016/j.iot.2022.100514

[8] Alsaroah, A. H., & Al-Turjman, F. . Combining Cloud Computing with Artificial Intelligence and Its Impact on Telecom Sector.NEU Journal for Artificial Intelligence and Internet of Things,2(3),https://dergi.neu.edu.tr/index.php/aiit/article/view/731

[9] M. Xu et al., "Deep learning-based human activity recognition for IoV-enabled smart city: A big-data approach," Transactions on Emerging Telecommunications Technologies, vol. 33, no. 12, p. e4315, 2022. [Online]. Available: https://dl.acm.org/doi/10.1002/ett.4315

[10] W. Shi, J. Cao, Q. Zhang, Y. Li, and L. Xu, "Edge Computing: Vision and Challenges," IEEE Internet of Things Journal, vol. 3, no. 5, pp. 637-646, Oct. 2016. [Online]. Available: https://ieeexplore.ieee.org/document/7488250

[11] M. Armbrust et al., "A view of cloud computing," Communications of the ACM, vol. 53, no. 4, pp. 50-58, 2010. [Online]. Available: https://dl.acm.org/doi/10.1145/1721654.1721672

[12] Amazon.com CEO Jeff Bezos on Animoto (Apr. 2008); http://blog.animoto.com/2008/04/21/amazon-ceo-jeff-bezos-on-animoto/.Google Scholar

[13] Amazon S3 Team. Amazon S3 Availability Event (July 20, 2008); http://status.aws.amazon.com/s3-20080720.html.

[14] Amazon Web Services. TC3 Health Case Study; http://aws.amazon.com/solutions/case-studies/tc3-health/.

[15] Armbrust, M., et al. Above the clouds: A Berkeley view of cloud computing. Tech. Rep. UCB/EECS-2009-28, EECS Department, U.C. Berkeley, Feb 2009.

[16] Barroso, L.A., and Holzle, U. The case for energy-proportional computing. IEEE Computer 40, 12 (Dec. 2007).