THE ROLE OF ARTIFICIAL INTELLIGENCE FOR NEGOTIATIONS IN THE DIGITAL AGE

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Abstract: *Using artificial intelligence for negotiations may sound futuristic, but the future is here - and it's transforming the way deals are made. By using machine learning and complex alghoritms, AI systems are now capable of observing interactions, in real time, and deliver informed recommendations on how to proceed with engagement. This information can then benefit negotiators, managers, analysts as well as research looking into the increasingly expanding role of AI in problem-solving and decision-making.*

In an effort to make artificial intelligence (AI) more accessible, in the spring of 2019 group of researchers at MIT have found a way to use artificial intelligence to train machine-learning systems much more efficiently.[1] Their hope is that the new time- and cost-saving algorithm will allow resource-strapped researchers and companies to automate neural network design. In other words, by bringing the time and cost down, they could make this AI technique more accessible.

Today, AI can design machine learning systems known as neural networks in a process called neural architecture search (NAS). But this technique requires a considerable amount of resources like time, processing power and money. Even for IT giant like Google, producing a single convolution neural network - often used for relatively simple task such as image classification - takes 48,000 GPU hours. Now, MIT researchers have developed a NAS algorithm that automatically learns a convolution neural network in a fraction of the time - just 200 GPU hours.

Speeding up the process in which AI designs neural networks could enable more people to use and experiment with NAS, and that could advance the adoption of AI. While this is certainly not uncomplicated, it could be a step toward putting AI and

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[1] Fisher, Christine, MIT's AI can train neural networks faster than ever before, Engadget, March 22, 2019, available at https://www.engadget.com/2019/03/22/mit-ai-automated-neural-network-design/

machine learning in the hands of more people and companies, freeing it from the monopoly of tech giants.

And this is just the beginning.

AI is capable of performing many tasks that enhance human labor and thinking. Can it provide an advantage in the negotiation process as well?

Artificial intelligence-based systems are now capable of observing human interactions in real time and delivering informed recommendations on how to proceed.

Negotiation is a dialogue between two or more people or parties intended to reach a beneficial outcome over one or more issues where a conflict exists with respect to at least one of these issues. This beneficial outcome can be for all of the parties involved, or just for one or some of them. It is aimed to resolve points of difference, to gain advantage for an individual or collective, or to craft outcomes to satisfy various interests. It is often conducted by putting forward a position and making concessions to achieve an agreement. The degree to which the negotiating parties trust each other to implement the negotiated solution is a major factor in determining whether negotiations are successful.

Negotiating in digital environment

Typically, negotiation has been known to be more art than science — the art of getting what you want or need from person-to-person interaction or bargaining. Nowadays, as more interaction occurs electronically — via email, phone, text chat or social media — there is quite a bit of science being applied to the negotiation process as well. This does not mean that relationship building becomes less important. Quite the contrary, with new technology growing pains; trust and relationships become even more critical. But AI is capable of performing many tasks that enhance human labor and thinking — so it is only logical that it can provide an advantage in the negotiation process as well.

Since the early 20th century the practice of conducting negotiations has become increasingly professionalized, being carried out by accredited career diplomats and experts supported by staff and infrastructure, such as consulates, embassies and corporate departments. But over the last 50 years the way teams contact people and

have conversations has evolved in a way that could never have been imagined by past generations. This is of course because technology has become absolutely integral to the way that we communicate, with people in business using ever-evolving tech platforms with which to do so. Meetings have been replaced with teleconferences and spoken conversations (whether face-to-face or on the phone or Skype) have been replaced with emails and texts.

Relationships have changed because of these new mediums, and negotiation process itself has had to evolve too. When negotiating in person the psychology, tactics, and strategies of negotiation are well studied and practiced. Conversely, the answers to questions raised by negotiating electronically are less clear and can be contradictory.[2]

Regardless of whether you negotiate internally or externally, negotiating in person allows a high level of perception and creates psychological "closeness" between the two parties. This allows for the internal understanding that the person on the other side of the table is in fact a human being, and puts the negotiator in a position where they can identify this and apply appropriate judgment to the negotiation in order to maximise the deal.

Holding negotiations digitally via email or text removes this psychological "closeness" and means that the human side of the equation is often removed from the interactions. Many social cues are filtered out and creating a meaningful relationship with the other party becomes challenging. Indeed, studies have shown that when negotiating electronically, people often display more aggressive behavior[3] – which is perhaps attributable to lack of social cues and perceived level of "being untouchable" due to lack of direct physical contact. Ambiguous information conveyed through this medium is more likely to be interpreted as negative, and therefore more likely to provoke a negative response and conflict.

The digital age arrives with a set of big challenges for traditional channels of communication: new relations with counterparts and audiences (interactivity), new languages (multimedia) and a new grammar (internet slang).

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[2] The Digital Age Of Negotiation, Learner Events, July 18, 2019, available at
https://www.learnevents.com/blog/2019/07/18/the-digital-age-of-negotiation/
[3] Ibid.

As far as enterprises, institutions, administrations, organizations, groups, families and individuals start their own online presence, they become "media" by their own, they also become "sources" for traditional media, and in many cases, they produce strong "media criticism": opinion about how issues are covered by legacy media and delivering of alternative coverage.[4]

Blogs and social media represent the ultimate challenge for the old communication system because they integrate both: the new features of the digital world and a wide democratization in the access to media with a universal scope.

The overflow of information calls for new skills and tools to manage data, news, and opinions, to make informed decisions and bargain. Content syndication, news aggregators, news readers, popularity rankings, recommended reading, most viewed lists, trending topics, are but just a few of the tools available to navigate this chaos of information abundance.

The extraordinary amount of data available in the digital age bring about the strategic role of content analysis as a research method for studying documents and communication artifacts, which might be texts of various formats, pictures, audio or video - a role to be shared with an increasing number of new players. The analysis of data and its transformation into knowledge becomes the axis of communication-related activities. Today, the strategic mission of information expert is the information about the information: information intelligence, interpretation, filtering and searching combined with the challenge of new interactive multimedia narratives and delivered by a wide range of channels.

But this revolution not only changes the communication landscape for the usual players, most importantly, it opens the mass communication system to a wide range of new players.

And some of them might not even be human.

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[4] Orihuela, Jose Luis, The 10 new paradigms of communication in the digital age, November 6, 2017, Medium, available at https://medium.com/@jlori/the-10-new-paradigms-of-communication-in-the-digital-age-7b7cc9cb4bfb

Getting a help - from an AI friend

Although the term may still conjure up sci-fi images of robots gone rogue, artificial intelligence or AI, as it is often called for short, is actually far less terrifying. Computer science defines AI as any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals.[5] A more elaborate definition characterizes AI as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation of the knowledge acquired.[6]

AI often revolves around the use of algorithms. An algorithm is a set of unambiguous instructions that a mechanical computer can execute. A complex algorithm is often built on top of other, simpler, algorithms. Many AI algorithms are capable of learning from data; they can enhance themselves by learning new strategies or rules that have worked well in the past), or can themselves write other algorithms.

Efforts to develop a general approach for structuring and modeling negotiations, based on integration of AI techniques with decision theoretic methods exist as early as 1990.[7] However, in recent years computers have made it efficient and practical to conduct bargaining interactions electronically. Parties introduce themselves through e-mail exchanges, and send bargaining proposals back and forth as attached electronic files. This is an especially economical way to deal with parties located in other states or in other countries. You may know the art of the deal, but there's a science to it, too. And artificial intelligence is beginning to learn it. Computers that could negotiate for us could automate and optimize everything from traffic intersections to global treaties. Things start small enough - there are simple bots on eBay, for example "sniping agents" that bid at the last possible second. And there is software that bids for ad placement online. Then there are negotiation support systems, software that assists humans by suggesting win-win outcomes. In a job

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[5] Poole, David, Mackworth, Alan and Randy Goebel, Computational Intelligence: A Logical Approach, 1988, New York: Oxford University Press

[6] Kaplan, Andreas and Michael Haenlein, January 1 2019, Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence, Business Horizons

[7] Sycara, Katia, Negotiation planning: An AI approach, European Journal of Operational Research, Volume 46, Issue 2, 25 May 1990

negotiation, the system might suggest whether to ask for higher base salary or additional benefits based on what it knows about the company or the boss.[8]

Even though we still lack autonomous negotiators in the full sense of the word, humans still often fail to reach the best agreements where computers can. On top of that, computer negotiation can be done very fast. Autonomous negotiators could be used in haggling at a marketplace, buying a house, setting a meeting, or solving political gridlock when parties need to negotiate a very complex deal.

In September 2019 Estonian company named Pactum launched artificial intelligence tool for commercial negotiations. It is an AI-based system that helps global companies to autonomously offer personalized, commercial negotiations on a massive scale. Inefficient contracting has been estimated to cause firms to lose between 17% to 40% of the value on a given deal, depending on circumstances, according to research by KPMG.[9] Augmented artificial intelligence evaluates agreement terms and offers an unbiased resolution that can result in either business development or renewed agreements where both parties have been equally evaluated to support a fair deal. Based off of historical data, terms are suggested and discussed through an auto generated chat-like interface to generate a contract that is then ready for review and sign off.

In order for a business to successfully scale on a global level, it is important to be able to build and maintain partnerships on every level. Each marketplace includes thousands of partners, each with different requirements, languages and cultures. In order for both parties to flourish, each partnership needs to keep the terms of their agreement up-to-date. In practice, this equates to volumes of contracts going out every day with individualized terms for each partner. AI systems like Pactum are able to support personalized deals with millions of partners within minutes, enabling global businesses to solidify their relationships and ensure local communities feel supported.

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[8] Hutson, Matthew, How artificial intelligence could negotiate better deals for humans, Science Magazine, September 2017, available at https://www.sciencemag.org/news/2017/09/how-artificial-intelligence-could-negotiate-better-deals-humans

[9] Pactum Launches Artificial Intelligence Tool for Commercial Negotiations, Bloomberg, September 11, 2019, available at https://www.bloomberg.com/press-releases/2019-09-11/pactum-launches-artificial-intelligence-tool-for-commercial-negotiations

A Danish company called iMotions has created software for tracking human emotions which uses computer vision to identify emotions from facial expressions. Professionals and researchers are already using iMotions' software to analyze videos of negotiation simulations. They are trying to isolate particular emotions that have influence on the outcome of negotiations by anwsering the question "How do you make a positive impression on your counterparty and how does that relate to your facial expression?"[10] Ideally, one day an AI-enabled alarm could warn a negotiator when a counterparty's facial expressions indicate a bargaining session is about to go south. IBM's "Project Debater" AI can analyze a proposition and automatically highlight the best arguments for and against it, factoring in both logical and emotional impact. These technologies could transform business negotiations and probably do so long before we have robot lawyers.

But human emotions are just one of many variables that AI system will be able to analyze and predict while searching for the best possible way to conduct a negotiation. Rather than monitor singular conversations and interject recommendations on a case-by-case basis, the AI-based negotiation system of the future would digest lots of conversational data across lots of sales reps to try to understand where there are coaching opportunities, new training opportunities, value prop improvement opportunities, and product improvement opportunities.

To date, existing work on chatbots has led to systems that can hold short conversations and perform simple tasks such as booking a restaurant. But building machines that can hold meaningful conversations with people is challenging because it requires a bot to combine its understanding of the conversation with its knowledge of the world, and then produce a new sentence that helps it achieve its goals. Similar to how people have differing goals, run into conflicts, and then negotiate to come to an agreed-upon compromise, research has shown that it's possible for dialog agents with differing goals (implemented as end-to-end-trained neural networks) to engage in start-to-finish negotiations with other bots or people while arriving at common decisions or outcomes.[11]

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[10] Kahn, Jeremy, An Offer You Can't Refuse: How A.I. Is Poised to Transform Negotiations. Eye on A.I., Fortune, September 3, 2019, available at https://fortune.com/2019/09/03/ai-negotiations-eye-on-ai/

[11] Deal or no deal? Training AI bots to negotiate, Facebook Engineering, June 14, 2017, available at https://engineering.fb.com/ml-applications/deal-or-no-deal-training-ai-bots-to-negotiate/

To go beyond simply trying to imitate people, researchers at Facebook Artificial Intelligence Research (FAIR) instead allowed the model to achieve the goals of the negotiation. To train the model to achieve its goals, the researchers had the model practice thousands of negotiations against itself, and used reinforcement learning to reward the model when it achieved a good outcome. To prevent the algorithm from developing its own language, it was simultaneously trained to produce humanlike language.

A two-month test pitting 20 lawyers against AI from LawGeex, a leading AI contract review platform, showed that humans were no match for a robot in spotting risks within the legal documentation for non-disclosure agreements – deals meant to protect confidential information such as new manufacturing processes and marketing schemes. The AI's highest accuracy rating on an individual test was 100 percent, while the highest rating a human lawyer achieved on a single contract was 97 percent. As far as accuracy goes, the study showed that humans can (for the most part) keep up with AI in reviewing contracts. The same couldn't be said when it came to speed, however. On average, the lawyers took 92 minutes to finish reviewing the contracts. The longest time taken by an individual lawyer was 156 minutes and the shortest 51 minutes.[12]

The accuracy and speed of AI in reviewing legal documents shows clearly the game-changing potential of technology for trade negotiations. Just as important, the new technology could also make trade negotiations more transparent for everyone, including the public, by restoring confidence in the global rules-based system.

(Just some of the) Challenges that lie ahead

The influence of digitization and the Internet has caused a change in the way we communicate, learn and conduct commercial business. There is no question that easy access to the Internet, like the introduction of mail service and the invention of the telephone, has changed the nature of people's connection to others in their social world. Mail made possible connections among people without physical proximity, the telephone facilitated communication among distant people, making rapid connections possible across long distances, and e-mail enables the rapid

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[12] Leary, Kyree, The Verdict Is In: AI Outperforms Human Lawyers in Reviewing Legal Documents, Futurism, February 27, 2018, available at https://futurism.com/ai-contracts-lawyers-lawgeex

dissemination of information to multiple locations simultaneously. Indeed, progress is a fact of life and technological advances are being made at an ever increasing rate. However, as we embrace these changes, we are forgetting some of the more traditional means of communication and a new set of challenges emerge. The increasing dependency on digital infrastructure comes with certain drawbacks and specific which should be taken into account.

First of all, on a very basic level bargaining involves personal interactions. It is difficult to have good personal interactions conducted entirely by exchanging emails or through video conference. It is so much easier to establish critical rapport through in-person or telephone exchanges during which the parties talk directly to one another. Studies show that negotiators who got preliminary meetings or even a phone call before official e-mail exchanges, they behaved more cooperatively, reached more agreements, and achieved more efficient arrangements than those who had no preliminary phone calls.[13]

Another unfortunate fact of electronic communication concerns the ease with which communicators can exchange intemperate comments most would be unlikely to convey in person or on the telephone. Also, written words are prone to misinterpretation when become the only method of communication. Without seeing and hearing non-verbals, it is easier to misunderstand the words. When we are unsure about words and when we trust the other person less, we pay more attention to the non-verbal communication of what we hear and see. One critical risk often ignored by electronic negotiators concerns the possibility they will convey far more information in their electronic files than they intended to convey. Depending upon the software used, many of the alternative formulations may be buried in the electronic files as metadata. Knowledgeable computer experts may be able to "mine" the electronic files for such information and obtain comments and changes the sender did not intend for them to view.[14]

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[13] Craver, Charles, Conducting Electronic Negotiations, July 2007, Mediate, available at
https://www.mediate.com/articles/craverC1.cfm
[14] Ibid.

When negotiating electronically and especially when counting on AI for assessment and suggestions, emotion is removed from the negotiation.[15] As such, empathy is replaced by insensitivity and a number of persuasion techniques are eradicated. Rapport and feel good emotions no longer count.

As a result, If you have a high value or important relationship that you wish to protect and develop, a purely digital relationship will not be sufficient. The physical interaction between two parties is not something that can be effectively achieved over the internet. It is a basic human fact that two people or organizations need to be physically present in order to build rapport and trust. Sellers and negotiators need to get back face to face with their key clients, they need to build relationships with the end-users, and they need to hone their rusty negotiation skills quickly before they are lost. Also, the questions arises how do we empower these AI bots and systems while still trusting them. Since AI holds great promises (as well as dangers), tech companies, researchers and AI enthusiasts are especially concerned about how to build trust in AI to foster adoption or usage. Trust can be seen as a psychological mechanism to cope with uncertainty and is located somewhere between the known and the unknown.[16] As such, it is exponentially more difficult to establish the concept of trust within AI environment than to simply feed some information in the machine.

Moreover, there is the lingering question should we be scared of artificial intelligence in general. Since recent developments have made super-intelligent machines possible much sooner than initially thought, the time is now to determine what dangers artificial intelligence poses. The legal, political, societal, financial and regulatory issues there are so complex and wide-reaching that encompass all spheres of modern life. And while many are concerned with the risk of AI being programmed to do something dangerous like operating weapons, the field of communications - and within it the negotiation process itself - is also not exempt from new types of risk associated with machines.

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[15] Buzza, Simon, Are we Forgetting how to Negotiate in the Digital Era?, New Dawn Partners, September 2016, available at https://www.newdawnpartners.com/app-data/news_docs_uploads/2016-09-30-16098445508e160f57e836c9814886111f83-3-Are_We_Forgetting_How_to_Negotiate_in_the_Digital_Era.pdf
[16] Brukhardt, Michael, How-To Build Trust in Artificial Intelligence Solutions, Medium, May 2019, available at https://medium.com/omdena/how-to-build-trust-in-artificial-intelligence-solutions-a6d3c7ddf4c3

Social media through its autonomous-powered algorithms is very effective at target marketing. There are people and computers out there who know who we are, what we like and are incredibly good at surmising what we think. Investigations are still underway to determine the fault of Cambridge Analytica and others associated with the firm who used the data from 50 million Facebook users to try to sway the outcome of the 2016 U.S. presidential election and the U.K.'s Brexit referendum, but if the accusations are correct, it illustrates AI's power for social manipulation.[17] By spreading propaganda to individuals identified through algorithms and personal data, AI can target them and spread whatever information they like, in whatever format they will find most convincing—fact or fiction.

We all sit at the table together

Over the past few years, an unprecedented number of users were able to experience a dialogue with this kind of AI, whether that be via virtual personal assistants integrated into their smartphones or connected devices. The most well-known technology of this kind includes Apple's virtual assistant, Siri, Amazon's Alexa, and Google's integrated Assistant. Though these assistants have shown their incredible utility in a digital age, their conversational skills remain simple. The machine/A.I. and human interaction is also a focal point of research in many universities and companies worldwide. Autonomous systems that are capable of negotiating on our behalf are among society's key technological challenges for the near future, and their uptake is important for many critical economical application areas. AI agents are, in fact, already used for all sorts of more narrow negotiations, like figuring out the correct price for an online ad, or the right bid for a stock. But it is fascinating to imagine them taking on more human areas of deal-making. By continuing along this trajectory, negotiation research can address perhaps the biggest challenge of all: a co-active approach that simultaneously advances the autonomy of a negotiation agent in all its aspects.[18]

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[17] Marr, Bernard, Is Artificial Intelligence Dangerous? 6 AI Risks Everyone Should Know About, Forbes, November 19, 2018, available at https://www.forbes.com/sites/bernardmarr/2018/11/19/is-artificial-intelligence-dangerous-6-ai-risks-everyone-should-know-about/#681ff90a2404

[18] Can Artificial Intelligence Master the Art of the Deal?, Technology Review, September 12, 2017, available at https://www.technologyreview.com/f/608850/can-artificial-intelligence-master-the-art-of-the-deal/

We make hundreds, if not thousands, of decisions and preferential choices throughout a negotiation or everyday communication. Everything from big decisions to the words we choose in responding to questions is equally important for the successful outcome. Simulating this is no easy task and it will require new performance-based metrics that can assess how supplementary preference information influences negotiation performance. While AI is certainly pushing the boundaries of many things that traditionally relied on human intuition and engagement, it seems there's a long ways to go before autonomous AI negotiators take over. However, fully autonomous negotiators are achievable in medium-to-long future as we continue to see a rise of AI usage in supporting negotiations.

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