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ARTIFICIAL INTELLIGENCE APPLICATIONS AND IMPACT ON CONSUMERS – WITH A VIEW ON ROMANIAN CONSUMERS' PERCEPTIONS AND ATTITUDES RELATED TO AI

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ABSTRACT. Artificial Intelligence based technologies are becoming more and more pervasive in people's lives. Whether it takes the form of machine learning algorithms, Internet of Things smart devices, virtual assistants, chatbots, robots, AR/VR experiences, consumers are faced directly or indirectly, conscientiously or unconscientiously, with a variety of incarnations of what is generically called AI.

The current debate surrounding AI seems to focus on a few major aspects related to this next technological breakthrough. Right from the start, there is intense discussion even around the definition of AI: what is and what is not AI, how broad of a definition can be applied, and which of the many current and envisaged applications are actually 'intelligent'. Then, there is the critical issue of the use of consumers' personal data and underlying privacy issues, as AI seems to be built and thrive on being fed enormous amounts of data of various kinds. And lastly, there seems to be increasing concern regarding the potential for AI to evolve into AGI (Artificial General Intelligence – independent self-reliant robots) and the threats this poses to humanity.

A subject of potentially equal importance could be AI applications and implementations are impacting individuals' lives and the manner in which people relate to, perceive and assess AI and the underlying current technologies, both in terms of the impact in their daily lives, as well as in terms of expected prospects for the future.

This paper looks at the progress made so far in addressing some of the above questions and, by analyzing data from EU's 2017 Eurobarometer study, attempts to reveal how various Romanian consumer segments

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perceive and relate to AI and current technologies. It identifies potential emerging inequalities from access, acceptance and usage of these technologies at present and in the future. The paper also sets out future directions for further understanding of the intricate relationship between human consumers and emerging AI tech, both in terms of benefits as well as potential threats.

Keywords: Artificial Intelligence, algorithms, consumer behavior, decision making

JEL Classification: M30, M31, M39

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Introduction

Artificial Intelligence seems to be one of the top trending topics of our current age, both among academics, as well as the general public. The phrase is tossed around usually in connection with the most cutting edge technologies at peoples' disposal, but equally in relation to some which are currently in early development but have the potential to bring about a future that will bear little resemblance to our present times. It is the paradox of our times, that while many people around the world still lack access to basic necessities, such as clean running water, the same people, along with billions others from the more developed world, will own an internet connected smart phone capable of running some form of AI application.

But what actually is AI? What is the meaning (or meanings) people attach to this phrase when using it in conversations, research papers, news and opinion articles? Is there one connecting thread or are there many and varied understandings of the term? And if so, what are the implications?

This paper will attempt to provide a brief summary of the talk around AI at present, looking at various definitions, understandings and levels of development of AI. Apart from the manner in which the scientific and tech communities position themselves relative to AI and what it means, a greater concern is envisaged in relation to how the general public, the millions and billions of users of AI powered products and services, perceive and relate to AI as the emerging and potentially most disruptive technology of our times.

Artificial Intelligence – some definitions

While Artificial Intelligence is defined in many different ways, common elements could possibly be identified and a unified vision could eventually be achieved. (De Bruyn et. al., 2020) The challenge stems from the latter half of the phrase – what is and how do we define intelligence itself? Depending on who one asks, whether a psychologist, a neuroscientist, or maybe a philosopher, the definitions of intelligence could be counted in the tens. (Legg & Hutter, 2007)

One of the most widely accepted definition of AI is intelligence demonstrated by machines which would otherwise be observable only in humans (Shieber, 2004). It then follows that, similar to human intelligence, artificial intelligence should be capable of learning, understanding, reasoning, applying logic, solving problems and being capable of decision making, while the next level would be self-awareness – an area of even greater debate, as human conscientiousness itself still seems to escape pundits.

When looking at the various characteristics of intelligence and what they entail, one can conclude that most (the vast majority) of what is called AI at present is actually Machine Learning (ML), which could be simplest understood as the intersection between statistics and computing, resulting in algorithms capable of making certain predictions, based on certain inputs, leading to specific actions or decisions. (Jordan, 2019) ML is not actually new and could be considered the precursor (or originator) of Artificial Intelligence, as the first endeavors in the area of using computers to analyze data and find patterns based on which certain predictions could be made, which in turn would trigger specific decisions, date years back, as the preoccupation of engineers in automating industrial processes.

When dimensions related to self-learning, self-awareness, sentient machines are added to ML, we then move on to what is called AGI – Artificial General Intelligence – which some researchers maintain is the only level or form we should refer to as AI – the only one that bears a real semblance to human intelligence. (Goertzel, 2015; Haenlein & Kaplan, 2019)

Consequently, along the wide spectrum of definitions – as well as expectations – from AI, either everything could be called AI (meaning any simple statistical model and algorithm processed by a machine and yielding a certain output), or nothing yet could be called AI (as long as we are yet to attain AGI as defined above). (De Bruyn et. al., 2020)

Applications of AI – current state and future trends

Opting for a broader definition of AI as previously outlined, one question that arises is related to what are the current implementations, incarnations, applications of Artificial Intelligence that the general public is most likely to encounter on a day to day basis. What follows is a review of some of the most common services and products which espouse some form of AI, with no claim of exhaustiveness or comprehensiveness.

Recommender systems / algorithms*:* perhaps the most common form of applied AI and one which is present in individuals' lives at every toss and turn. Consider this: you wake up in the morning and as the habit is these days, the first thing one does is to pick up his / her smartphone. Without even unlocking it, the screen may display such information as the current weather and next hours forecast, state of the traffic from home to school or work, and upcoming calendar appointments. An algorithm powering your phone has culled this data from various sources residing on your phone to assemble the most relevant picture of your day from the very early hours of the morning.

As the day progresses, without even departing from the said device, you may find yourself writing a text message or email, at which point the predictive keyboard will try to guess and recommend words or phrases that might fit into what you are trying to say. Opening the search engine of choice in your web browser, typing just the first letters of your search will bring up a list of suggestions most relevant to your needs, location and time of day.

When the time comes to place your next online order, whether for groceries, supplies, or the rarer purchase of an expensive item, your choice of e-commerce platform will be ready to assist with recommendations based on your own past purchase history, or that of millions other shoppers that an AI has deemed to be just like you. (Smith & Linden, 2017)

The day is almost done and as you settle in front of the TV for some entertainment, YouTube, Netflix, Instagram or TikTok will be ready to assist, serving you the next episode in that series you've been watching for a while or a similar movie / show / clip that has a high probability of delivering maximum enjoyment and pleasure. (Haenlein & Kaplan, 2019)

All of the above are powered by sometimes simple, sometimes more complex, but all of them very data hungry algorithms whose simple logic could be summed up as: IF THIS THEN THAT, IF NOT THEN ELSE. All trying to guess, to predict what should come next – based on what has come before, from you, but also from millions other users 'like you'.

According to some sources, AI-powered recommender algorithms have become critical for the likes of Amazon (accounting for an estimated 35% of its revenues) (Forbes, 2018), or Netflix, where 80% of its content consumed by subscribers is influenced by its recommendation system, generating $1billion in revenue per year. (Gomez-Uribe & Hunt, 2016)

Intelligent Digital Assistants*:* growing in popularity (and ubiquity), these personal assistants (such as Apple's Siri or Amazon's Alexa) can help one with simple tasks, such as finding quick answers to specific questions, scheduling calendar appointments or setting reminders, dictating and sending text messages, or placing simple online orders for groceries and other items. Based to a large extent on algorithmic logic, fed by millions data points, and augmented with natural language processing abilities (NLP), these assistants are becoming an ever increasing presence in peoples' lives – an opportunity for the general public to experience and assess the current progress in AI, but also its most obvious limitations.

Chatbots: an increasing number of customer care / service centers these days are being staffed by software robots capable of carrying on simple conversations with unsuspecting clients. Whether calling your bank to obtain basic information such as how to open an account or what your balance

is, or going online to help centers to engage with a company or brand, you are more likely than not to be met by a robot employing NLP tech and predictive algorithms in an attempt to anticipate and answer you queries – while sounding as 'human' as possible. (Luo et. al., 2019)

***Physical intelligent robots**:* while many dabble in distant visions of a sometimes dystopian future (as exemplified by recent efforts such as Sophia the robot or Boston Dynamics NYPD robo-dog), perhaps the most palpable form of physically incarnate intelligent robot is currently represented by the self-driving autonomous vehicle (from delivery drones, to driverless trucks to autopilot driven EV's and similar). With tens of different players involved in and fiercely competing for this potentially huge market, autonomous vehicles seem to be making slow and modest progress, not in small measure due to an intense scrutiny from both authorities and the general public. Case in point, the recent deadly accident involving a Tesla and two passengers driving on autopilot received wide coverage, while at the same time tens or hundreds of lethal accidents in the same geographical area, but involving traditional cars and drivers, go largely unnoticed and unreported.

Challenges of AI

While the growth of AI has been exponential and will continue to be so for the foreseeable future, permeating every facet of our lives, increasingly there is talk about the challenges and threats posed by this technology and the way it will impact individuals and societies, for better or for worse. Increasingly, academics, business people, and regulators alike are involved in and shaping what is now a new field – AI ethics. Perhaps most telling with regards to the perceived potential threat of AI tech are recent examples, somehow reminiscent of Dr. Frankenstein's story, in which individuals are turning against their own creations and becoming advocates of human freedoms and privacy in the face of AI, such as Britney Kaiser, of the infamous Cambridge Analytica – Facebook scandal, or Caolan Robertson, of the Tommy Robinson – YouTube scandal.

Following in the line of AI applications outlined in the previous chapter, it seems that the biggest concerns related to AI stem from (Du & Xie, 2020):

- algorithmic biases, and the incorporation of ethical values of the intended target consumers – from a product perspective (Howard & Borenstein, 2018)
- data ownership and privacy, as well as cybersecurity threats and concerns – from a consumer / user perspective (Gwebu et. al., 2018)
- the impact on the social fabric and human interactions, the potential loss of jobs, unemployment and the rise of the so called useless class (Harrari, 2019) – from a broader societal perspective.

On the receiving end, individuals (as consumers) seem to hold ambivalent feelings towards AI-powered technologies: while most everyone seems to welcome and enjoy the benefits, novelty, sense of amazement and awe, when using products and services driven even in part by some form of AI; at the same time, many are harboring feelings of fear and dread resulting from the potential malevolent manifestations of such technologies. (Mick & Fournier, 1998)

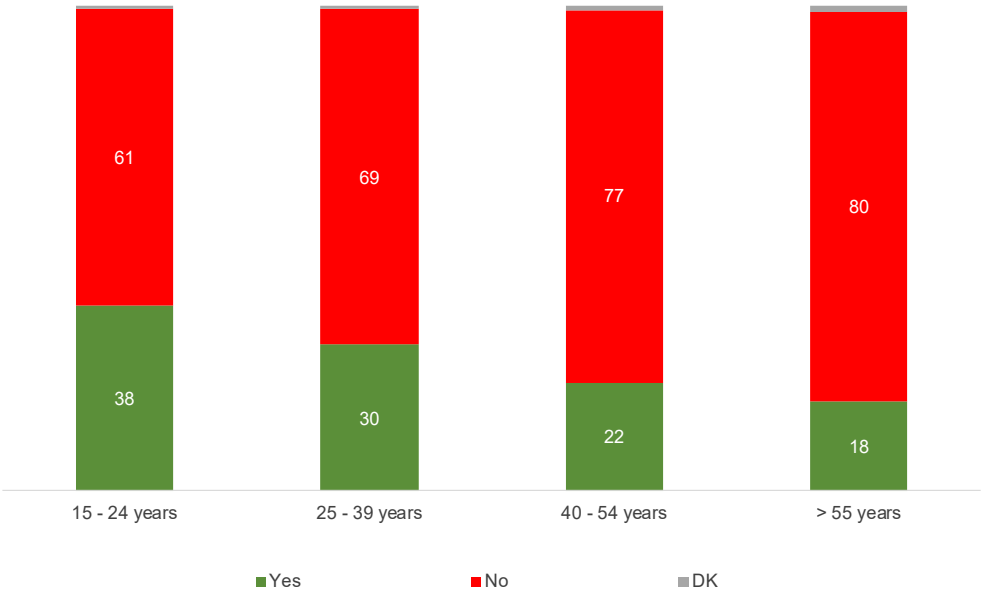
Romanian consumers' attitudes towards AI

In this section of the paper we look at some of the results of the 2017 EU wide Eurobarometer (European Commission, 2017) in order to capture some of the perceptions and attitudes of Romanian consumers in relation to the impact of the most recent technologies in their lives, and particularly that of Artificial Intelligence and robots. In particular, we look at the divide between various age groups, with the aim of identifying gaps and discrepancies which could lead to further inequalities in the society as AI and related technologies advance in the future and impact to an even larger degree the lives and livelihoods of various consumer groups.

In this particular wave of the Eurobarometer, 1089 Romanian individuals were interviewed, with a split on age groups as follows: 15-24 years old N=121; 25-39 years old N=342; 40-54 years old N=290; 55 years old and up N=337.

The first piece of information we look at is the perceived exposure to AI, as illustrated in Chart 1. Respondents were asked if in the past year they had heard, read or seen anything related to AI. What is striking about these findings is that even among the younger age groups, comprised to a larger extent of individuals more versed in technology, the perceived exposure to AI seems quite low. As expected, among older individuals, presumably less digitized or technologized, the numbers drop to about half. While question asked specifically referred to conscientious exposure to information related to AI, the low numbers of positive answers could also be interpreted as a lack of awareness among consumers regarding the ways in which AI is already present in our lives.

Chart 1 – In the past 12 months, have you heard, read or seen anything related to AI?

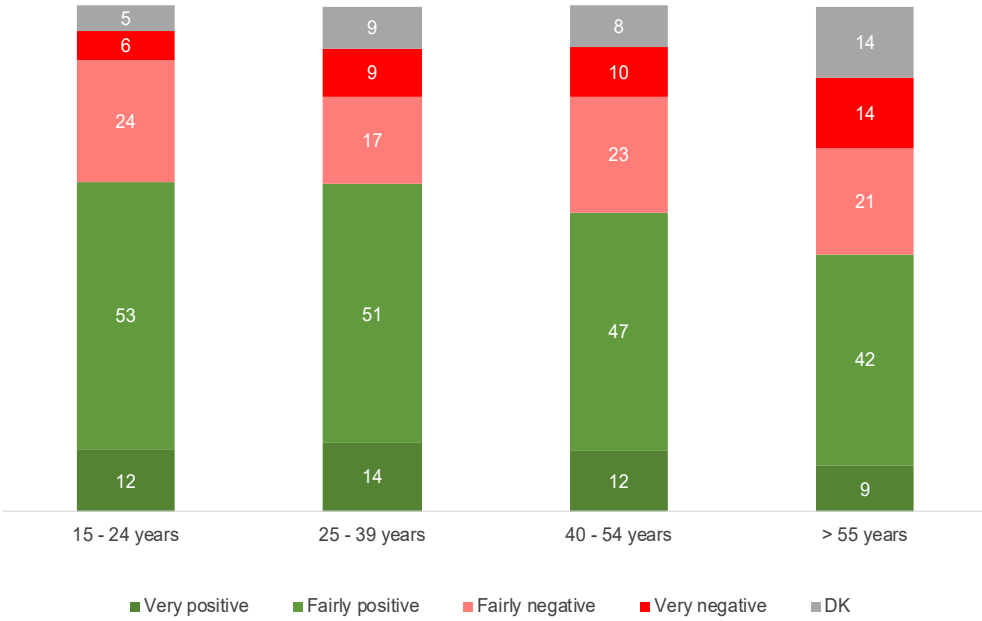


Source: Eurobarometer

The next piece of information we look at is the expressed overall opinion of respondents regarding robots and AI (Chart 2). On this subject, while a majority of respondents seem to have a positive attitude across

all age groups, the level of skepticism is increasing with age, reaching the highest levels among those who might be most vulnerable to the advances of AI technologies and manifestations in the future.

Chart 2 – General opinion about robots and AI



Source: Eurobarometer

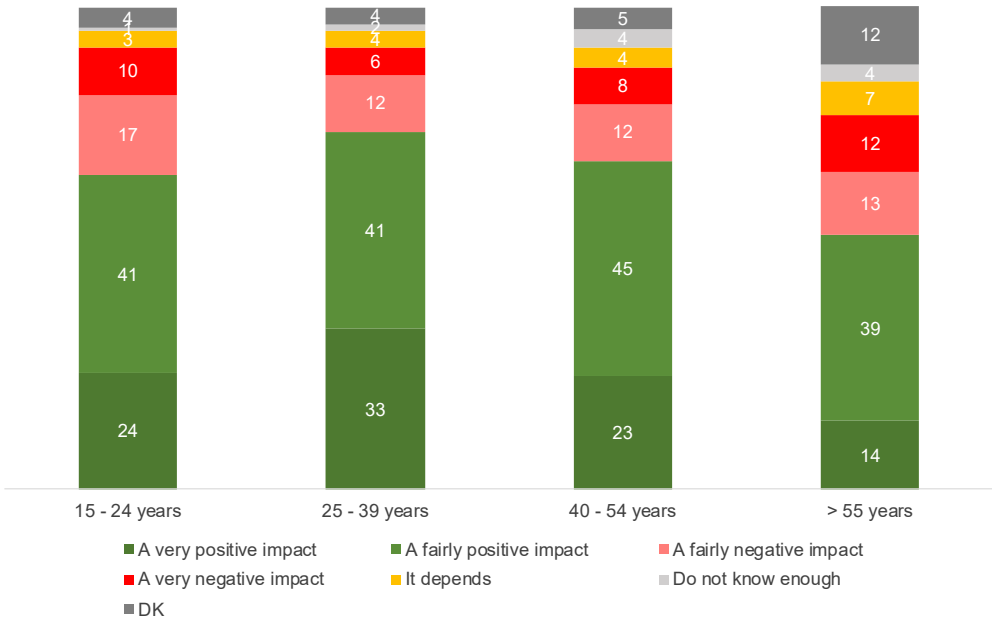
Similarly, when asked to assess the kind of impact the most recent technologies have had in their lives (Chart 3), one can observe the big differences between younger individuals, who tend to opine that technologies have a positive impact in their lives to a much larger degree, while a majority of older individuals either perceive the impact of technology as negative or are unable to offer a clear binary positive / negative assessment.

In terms of the threats posed by robots and AI relative to jobs replacement / loss (Chart 4), large proportions among all age groups, but particularly among older individuals, seem quite sure of the irreplaceability

of their jobs – which can also be interpreted as a lack of awareness regarding the potentially disruptive impact AI and emerging technologies might have on jobs in a not too distant future.

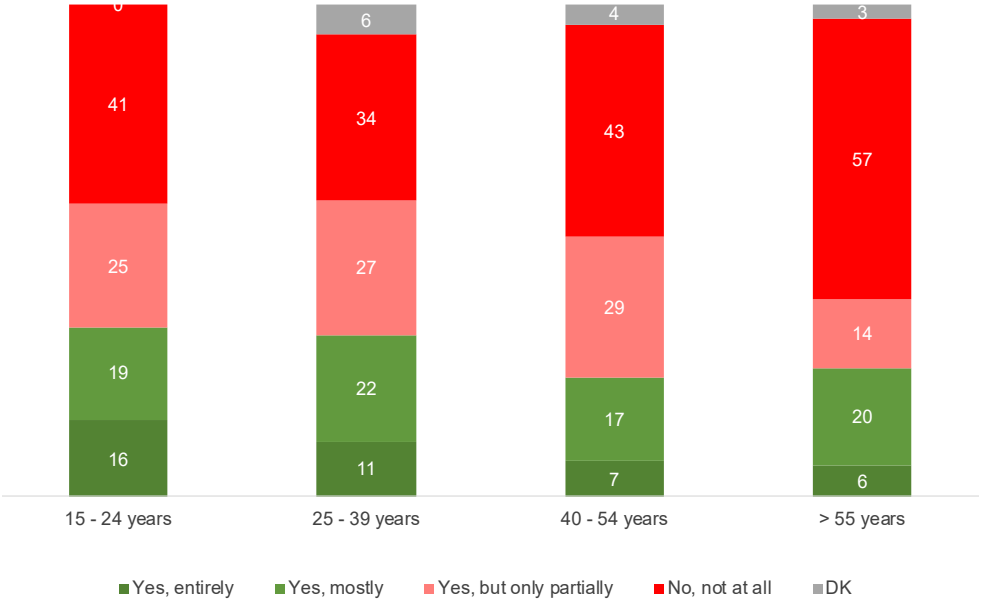
Finally, when asked which stakeholders are expected to tackle the various challenges posed by emerging technologies and AI (Chart 5), respondents seem to generally place more trust in national authorities, rather than EU authorities or the companies themselves. While this can also be interpreted as an expectation from society regarding the role national authorities should play in regulating AI and protecting consumers, the emphasis put on them could also be indicative of a lack of perspective regarding the truly global impact emerging technologies and AI are having and the need for a concerted effort of trans-national and cross-border stakeholders in acting in the best interest of individuals across the globe.

Chart 3 – What impact have the most recent technologies had on your daily life?



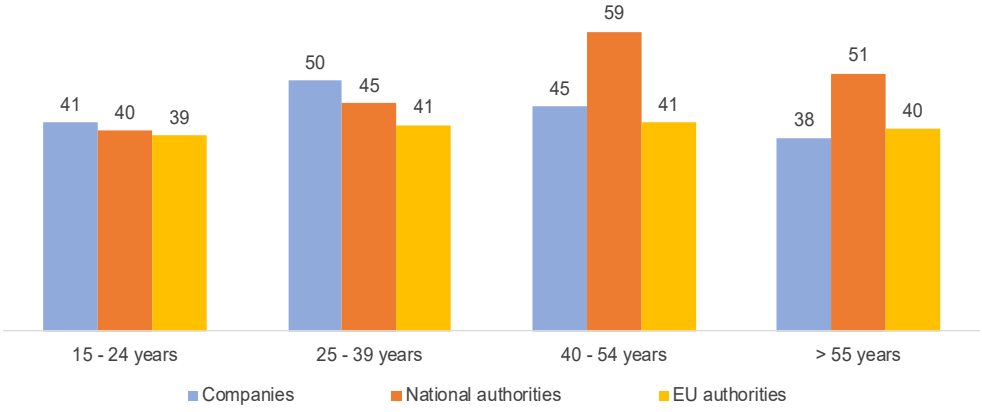
Source: Eurobarometer

Chart 4 – Could your current job be done in the future by robots or AI?



Source: Eurobarometer

Chart 5 – Which of the following actors are best positioned to act in order to tackle the impact of the most recent technologies?



Source: Eurobarometer

Conclusions and further research directions

This paper has looked at the current state of AI development, starting from the on-going debate about how we define AI, followed by an overview of some of the most common current AI implementations with which individuals and consumers experience increasing levels of interaction, then looking at some of the challenges posed by AI at present and potential emerging threats in the future. In the end, we looked at some of the findings of the 2017 Eurobarometer in terms of how Romanian consumers position themselves relative to current technologies and AI, revealing an existing and potentially growing inequality gap among generations and age groups, with older individuals seemingly at higher risk of being alienated as well as made more vulnerable in the face of rising AI tech.

The paper calls for more empirical research in order to identify consumers' awareness and openness to accommodating such technologies in their daily lives, as well as being aware and prepared to deal with the implications of their adoption. Further research is needed to both update the knowledge on perceptions and attitudes in 2021, as the COVID-19 pandemic accelerated several trends in the tech and AI industries; but also to determine the real levels of beneficial impact of these technologies in bettering consumers' everyday lives, while also uncovering their potential for harm.

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