Artificial Friend or Virtual Foe

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Is AI doing more good than harm?

I. Is AI doing any good at all?

Researchers, entrepreneurs, and policy-makers are increasingly using AI to tackle development challenges. In other words, **using AI for a greater good is a real thing**.

Several studies and prototypes have been run to prove the value of AI in high-impact fields such as healthcare (Chunara et al., 2012; Caicedo-Torres et al., 2016; Pathak and Kumar 2016; Robertson and DeHart 2010; Waidyanatha et al., 2013) or environmental issues (Tehrany et al., 2014; Ferris, 2010; Tien Bui et al., 2012; Kapoor et al., 2010). However, it is becoming clear that **AI poses as many threats as benefits**, although the former ones are usually neglected.

I do not want to get into trust, accountability, or safety issues in this short piece (if you want, here there is more), but avoiding the negative effects of AI is why incorporating a set of ethical principles into our technology development process is so paramount. Ethics plays a key role by ensuring that regulations of AI harness its potential while mitigating its risks (Taddeo and Floridi, 2018) and it would help us understand how to use responsibly the power coming from this technology. In fact, if from one hand AI can increase efficiency, access, and productivity, on the other side it might constraint resources and increase inequalities (Vinuesa et al., 2019).

Hence, **AI is a neutral technology, it is intrinsically good and bad at the same time** (or none of the two, if you like), but we need to be sure to frame correctly its applications and uses. In a seminal paper, Floridi et al. (2018) highlight twenty different action points for a Good AI Society. Their analysis has a strong focus on Europe and concerns policy and ethical issues, but for the sake of using AI for good, I believe a few of those points are really cornerstones.

Assessing tasks that should not be delegated to an AI; developing auditing mechanisms to identify unwanted consequences and to compensate for a wrong caused by AI; financially incentivize cross-disciplinary collaboration. Some of the challenges listed in the paper will arise regardless of AI be present in our lives and could then be fixed by different solutions, but those I have just mentioned are so uniquely linked to data-driven applications to have to be considered when using AI for social applications.

However, even if we would be able to score everything correctly, and not jeopardize the

outcomes through a bad unethical design process, there is no certainty that the applications of AI would result in a better society or a healthier planet. We need first to overcome other bottlenecks.

II. Machine learning for the Developing World

If the limitations of implementing AI products and services in the developing world are known (Ali et al., 2016; Hilbert, 2016), it is also fairly clear they have a positive impact in those areas of the world (Dias and Brewer, 2009; Quinn et al., 2014). Machine learning can indeed be used to improve data reliability, inform policy and decision-makers, and be used "*without intermediaries*" since it can be directly built into deployed systems (De-Arteaga et al., 2018).

But how can we be sure that AI is effective in solving some of the world's most pressing challenges?

Well, first of all, we need to remove roadblocks in the technical development of complex intelligent systems. **Infrastructure constraints** are probably the most common and widespread in developing countries. The lack of computational power, the difficulty in repairing systems and sensors given the long travel distances, the lack of big storage systems, the scarce internet accessibility, and the overall limited financial resources, make using AI incredibly hard in many of those countries.

The second big challenge concerns **talents**. The lack of available and accessible specialized talent and the absence of a strong technical community complicate the effective use of any data-driven system. Finally, the **absence of (quality) data** is the last ingredient toward this recipe for (potential) disaster.

But where there is a problem lies also an opportunity. If transfer learning, data prioritization, or alternative datasets are nothing more than an exotic academic effort in many fields and mature economies, in developing countries are a necessity, and this may push forward the boundaries of the research.

If we would be able to overcome those issues, achieving an impact could not only be within sight, but it would be of a magnitude way higher than any other tool we used before.

What we only miss now is understanding where we can apply AI.

III. Sustainable Development Goals (SDGs)

Image Credit

The SDGs are the universal call to action to protect the planet and ensure our prosperity. It is natural then to link the AI applications to those principles, but always keep in mind that AI can act both as an **enabler** as well as an **inhibitor** for each of these SDGs.

Hence, I want to highlight here some positive examples, but also stress again that the impact AI has on each SDG is different in magnitude and direction — in other words, AI can provide many more benefits to the *environment* rather than other fields, and have a stronger negative effect on *society* with respect to, for example, the *economy* or the *environment* (Vinuesa et al., 2019).

So how can we apply AI to the Development Goals? Here it follows a small subset of examples:

1. **No Poverty:** Using satellite for resources allocation in remote areas (Efremova et al., 2019);
2. **Zero Hunger:** Increasing agricultural productivity to feed underserved areas;
3. **Good Health and Well-being:** Achieving a better diagnostics and faster drug-discovery, or predicting and tracking pandemic outbreaks;
4. **Quality Education:** Personalizing learning through preferences or different learning

paces;
5. **Gender Equality:** Reducing gender bias understanding where the bias is present in the first place;
6. **Clean Water and Sanitation:** Using AI to detect dangerous bacteria;
7. **Affordable and Clean Energy:** Optimizing wind power by creating digital wind farms;
8. **Decent Work and Economic Growth:** Improving productivity but also creating new jobs (e.g., data labeler, model trainer, etc.);
9. **Industry Innovation and Infrastructure:** AI can define new traffic routes or reconfigure software-defined networking components on the fly;
10. **Reduced Inequalities:** AI can provide "*intelligence augmentation*" or give sight to visually impaired people;
11. **Sustainable Cities and Communities:** Using AI for better urban planning, traffic management, or smart real estate;
12. **Responsible Consumption and Production:** AI-powered smart recycling equipment;
13. **Climate Action:** Using AI for disaster recovery, earthquake prediction, or solar geoengineering (Rolnick et al., 2019);
14. **Life Below the Water:** Tracking marine-life migration and combat illegal fishing;
15. **Life on Land:** Fighting illegal poaching and improving wildlife conservation;
16. **Peace, Justice, and Strong Institutions:** Using AI to fight crime and corruption;
17. **Partnerships for Goals:** AI can facilitate the interaction of traditionally distant players.

While the list above includes all the SDGs, of course it does not cover all the possible applications and examples of how AI can be used to address those goals (or meaningful problems, as classified by McKinsey Global Institute, 2018).

Conclusion

Scaling up AI to solve social and development issues is not an easy task, and it has to overcome several bottlenecks and mitigate risks to avoid the negative effects of this foundational technology.

Many big corporations are actively working to use AI for good, but something which has to be clear is that regardless of the action of institutional players as well as tech giants, everyone has to help at an inpidual level. Hence, we should probably start wondering what we can personally do to foster these efforts in our everyday life.

References

Ali, A., Qadir, J., Rasool, R., Sathiaseelan, A., Zwitter, A., Crowcroft, J. (2016). "Big data for development: Applications and techniques". Big Data Analytics 1: 2.

Caicedo-Torres, W., Paternina, A., Pinzón, H. (2016). “Machine learning models for early dengue severity prediction”. Ibero-American Conference on Artificial Intelligence. Springer: 247–258.

Chunara, R., Andrews, J. A., Brownstein, J. S. (2012). “Social and news media enable estimation of epidemiological patterns early in the 2010 Haitian cholera outbreak”. The American Journal of Tropical Medicine and Hygiene 86 (1): 39–45.

De-Arteaga, M., Herlands, W., Neill, D. B., Dubrawski, A. (2018). “Machine Learning for the Developing World”. ACM Transactions on Management Information Systems, 9 (2): 1–14.

Dias, M. B., Brewer, E. (2009). “How computer science serves the developing world”. Communications of the ACM 52 (6): 74–80.

Efremova, N., West, D., Zausaev, D., (2019). “AI-based evaluation of the SDGs: The case of crop detection with earth observation data”.
arXiv:1907.02813.

Ferris, E. (2010). “Natural disasters, conflict, and human rights: Tracing the connections”. The Brookings Institution.

Floridi, L., Cowls, J., Beltrametti, M. et al. (2018). “AI4People — An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations”. Minds & Machines, 28: 689.

Hilbert, M. (2016). “Big data for development: A review of promises and challenges”. Development Policy Review 34 (1): 135–174.

Kapoor, A., Eagle, N., Horvitz, E. (2010). “People, quakes, and communications: Inferences from call dynamics about a seismic event and its influences on a population”. In Proceedings of the AAAI Spring Symposium: Artificial Intelligence for Development.

McKinsey Global Institute (2018). Applying AI for Social Good”. Discussion Paper.

Pathak, S., Kumar, B. (2016). “A robust automated cataract detection algorithm using diagnostic opinion based parameter thresholding for telemedicine application”. Electronics 5 (3): 57.

Quinn, J., Frias-Martinez, V., Subramanian, L. (2014). “Computational sustainability and artificial intelligence in the developing world”. AI Magazine 35 (3): 36–47.

Robertson, J., DeHart, D. (2010). “An agile and accessible adaptation of Bayesian inference to medical diagnostics for rural health extension workers”. In Proceedings of the AAAI Spring Symposium: Artificial Intelligence for Development. Technical Report SS-10–01.

Rolnick, D., et al. (2019). “Tackling Climate Change with Machine Learning”. arXiv:1906.05433.

Taddeo, M., Floridi, L. (2018). “How AI can be a force for good”. Science 361 (6404): 751–752.

Tehrany, M. S., Pradhan, B., Jebur, M. N. (2014). “Flood susceptibility mapping using a novel ensemble weights-of-evidence and support vector machine models in GIS”. Journal of Hydrology 512: 332–343.

Tien Bui, D., Pradhan, B., Lofman, O., Revhaug, I. (2012). “Landslide susceptibility assessment in Vietnam using support vector machines, decision tree, and naive Bayes models”. Mathematical Problems in Engineering: 1–26.

Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Fellander, A., Langhans, S., Tegmark, M., Fuso Nerini, F. (2019). “The role of artificial intelligence in achieving the Sustainable Development Goals”. arXiv:1905.00501

Waidyanatha, N., Sampath, C., Dubrawski, A., Prashant, S., Ganesan, M., Gow, G. (2013). “Affordable system for rapid detection and mitigation of emerging diseases”. Digital Advances in Medicine, E-Health, and Communication Technologies: 271.

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About the Data Science Foundation

The Data Science Foundation is a professional body representing the interests of the Data Science Industry. Its membership consists of suppliers who offer a range of big data analytical and technical services and companies and individuals with an interest in the commercial advantages that can be gained from big data. The organisation aims to raise the profile of this developing industry, to educate people about the benefits of knowledge based decision making and to encourage firms to start using big data techniques.

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