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AI Smartz

Robust Machine Learning Solutions

Deep Learning vs Machine Learning

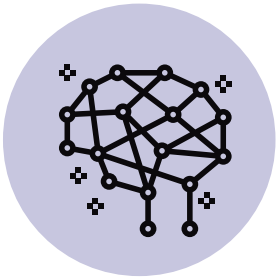
DEEP LEARNING VS MACHINE LEARNING

APRIL -2019

WHITEPAPER

Deep Learning vs Machine Learning

Deep Learning and Machine Learning are not the quite the same. Yet they bear some similarities. Let us have a closer look in this white paper…..



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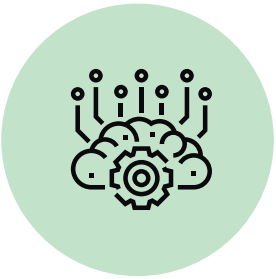


Artificial Intelligence

A technique which enables machines to mimic human behaviour

Machine Learning

Subset of AI techniques which use statistical methods to enable machines to improve with experience

Deep Learning

Subset of ML which make the computation of multi-layer neural network feasible

Deep Learning Itself

First of all, unlike Machine Learning, which mainly centralizes the core of its efforts on solving real - world problems, which of course is beneficial, Deep Learning is a bit more, implementing what has been learned through Machine Learning and taking things a step further, still. Machine Learning incorporates neural networks and AI (or Artificial Intelligence), respectively, hoping to properly mimic the every actions of the human decision - maker, so as to more effectively enact a future response, prediction or predictability rate, and much more. Two very narrow subsets, are what ML's (Machine Learning's) tools focus on, mainly.

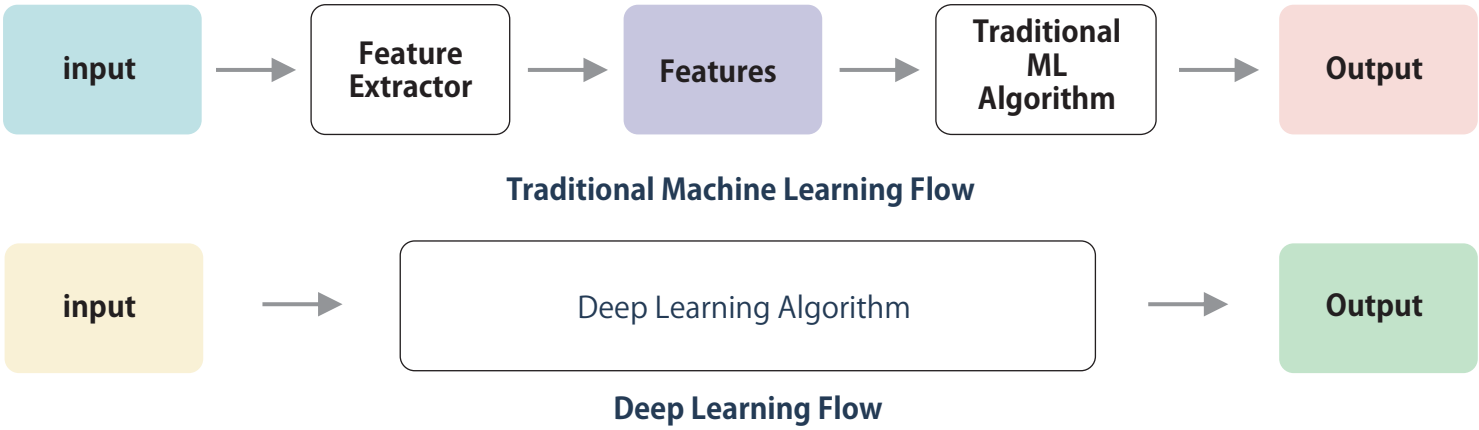
Deep Learning must be integrated, to go deeper, requiring a targeting of problems that require further insight, and of particular importance, those within these areas :

1. **Hidden Layers**
2. **Input Layers**
3. **Output Layers**

Deep Learning, as such, falls underneath Machine Learning, as one of its major subsets, relatively speaking. It's one of the newest terms in its field, as well as one of the best ways to incorporate it. So without Machine Learning, Deep Learning would not exist ---- without Deep Learning, on the other hand, Machine Learning would not be as beneficial. The two do go hand - in - hand.

Machine Learning itself, on another note, is invaluable for when it comes to predicting a human being's weight based upon his or her height, for instance. Data capturing errors, and false information, mostly, may be rightfully detected through the best of the latest ML. It all begins with the proper collection of all data (or data streams), having data points represented on graphs, charts, or other visual illustrations of analysis. Predictions and results are the two final measurements for performance across any test or study, respectively, holding the final word. One such formula for addressing this could be Weight (in kg) = Height (in cm) - 100.

Three Main Forms of Learning Algorithms to Assess



The first of three encompasses Supervised Machine Learning, which is all about making the right predictions and therefore offering the most analytical value in advance. Value labels get sent to data points, and certain algorithms must then find their correlating patterns. The second learning algorithm would be that of Unsupervised Machine Learning, which has all the more to do with assessing data points, which have not been assigned to any labels of any kind whatsoever. Groups of clusters, here, are how data gets organized --- this is a common Machine Learning algorithm.

Furthermore, we come to the last of the three, which would be Reinforcement Machine Learning Algorithms, which mainly serve in helping to pick out an action, respectively. These actions base themselves on certain data points, targeting one at a time, per each data point. The algorithm here, over time, self - learns, and in doing so, changes its own strategies and protocols (so as to better learn and adapt to new ones, and much more).

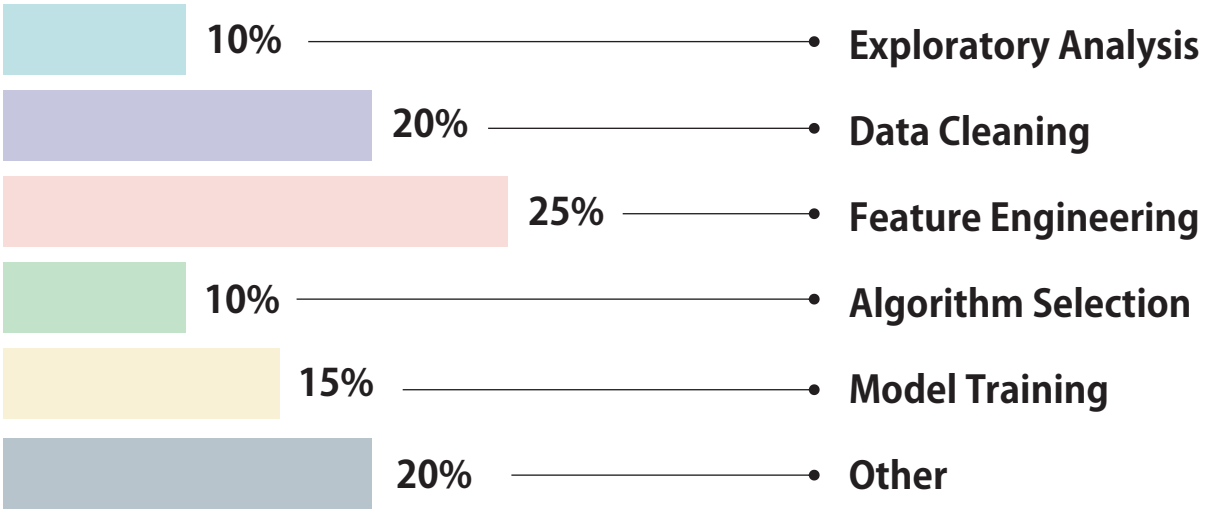
Certain Dependencies in Terms of Data

Machine Learning's and Deep Learning's algorithms both base themselves off of potentially performance as the main separating factor. Yet when the amount of data is very small, or limited in quantity, one may find that Deep Learning algorithms may not work as well, since as has been mentioned, they are initially designed for further, more complex and higher amounts of data, respectively. But when there is plenty of data to be broken down and processed, variated, and more (usually by means of larger organizations or firms who hold growing numbers of clients and databases), Deep Learning is the more preferable solution of the two. It is designed for engaging mass sums of information in short periods.

Certain Dependencies in Terms of Hardware

Deep Learning will, more often than not, rely upon high - end machines. Traditional, Machine Learning does the very opposite and holds its reputation for doing so, working to rely mostly on low - end machines. GPU's, as such, become a more central requirement - component for Deep Learning initiatives. Countless, ongoing, Matrix multiplication operations, as well, can be more effectively done on a larger scale --- through Deep Learning. Similar things may be said in terms of software, as well, which is better to integrate Deep Learning to⋯.when the need is more quantity- and quality- based.

What goes into a successful model



Feature Engineering

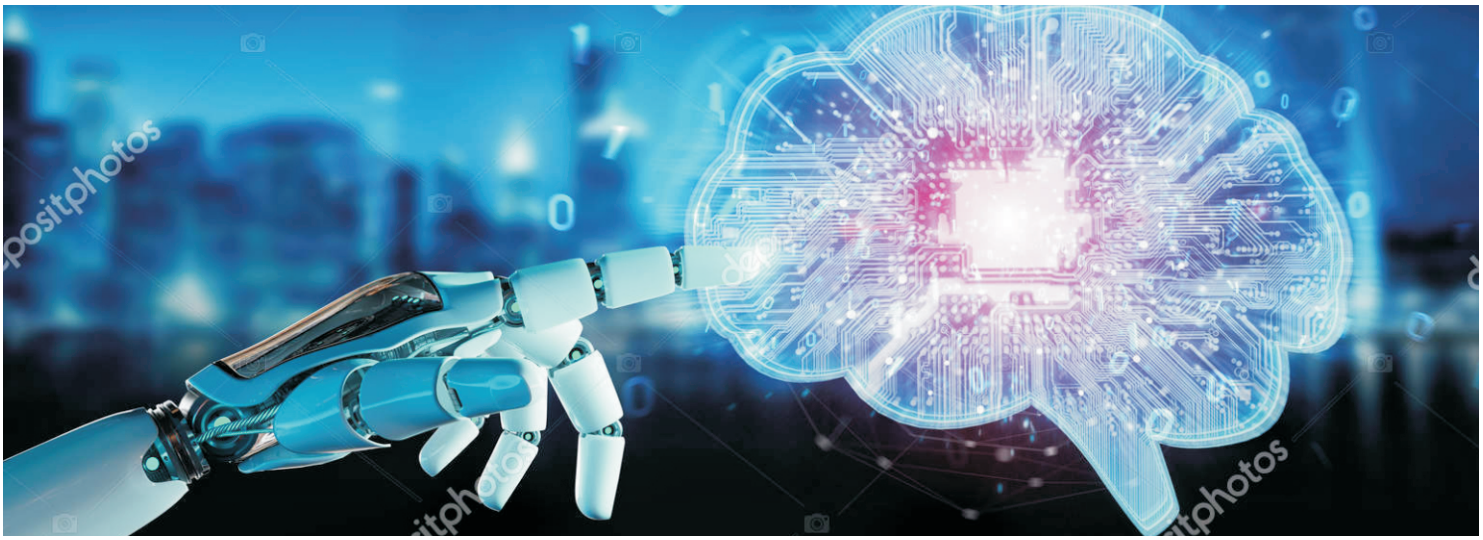
This very generic process involves domain knowledge, first and foremost, which ought to be properly put into making feature extractors with two goals. The first would naturally be to reduce data complexities, and the second might be to make all relevant patterns a whole lot more visible, in order to learn how the inter - related algorithms have been working (and can work) their best. Time - consuming and quite costly, not to mention quite difficult to fully, properly process, it is still worth a go. Many experts have already found value in incorporating both subsets within this category.

Approaches for Problem - Solving

'Traditional learning' algorithms, for example, are what have been used the most, for century upon century upon century⋯.in order to solve all forms of known problems or abnormalities. Yet what we have found, in the last two years, even, is that problems need to be broken down, each into separate parts, in order to then have to be solved, individually --- one by one. And perfectly combining them all, checking the work multiple times, is what would give us a result. Machine Learning, as such, would usually divide all problems into two separate steps, involving its detection and its recognition. This is just a side note to consider in assessing all of this...

Execution Time

Machine Learning is a lot quicker in both its training and execution times, though as we noted earlier, this does not account for it quantity or quality of data, separately. Deep Learning will take a lot more time ; one can not train it as quickly or easily as one would with traditional Machine Learning. Deep Learning's algorithms envelope so many parameters, and that is why ; one may train a Machine Learning algorithm, however, within seconds. Sometimes, it may take just a few hours, maximum, but with Deep Learning, it's far longer, usually ---- yet many would attest the longer wait is well worth it.



Conclusion - Final Word

Labeled data, 'structured data', as we have seen, certainly has much to do with comparing the two learning type subsets of AI. Firms may benefit most from Deep Learning, especially when working with massive streams of information. And for solving more complex problems, of which even Machine Learning might not address, Deep Learning is certainly the solution to choose from as we've also just seen. But for all cost - based, basic needs, perhaps not requiring much hardware or software advancements either, Machine Learning is ideal.

We see a few of the resemblances, and even cross - comparisons between the two : Deep Learning and Machine Learning, respectively. There has been much to note. Each of the two categories, either way, provides infinite value and future potential to nearly every sector on the globe, be it personal or professional. There remains much unsaid, worth a further probe…..

Netsmartz Global Delivery Center, Chandigarh, India

ABOUT NETSMARTZ

Who we are

Headquartered in Rochester, New York and with multiple offices across the globe, Netsmartz is a CMMi3 & ISO 9001:2008 certified company. Formed over 19 years ago, we currently have over 1000 employees, a rich experience of successfully executing 2000+ projects and working with small companies to Fortune 1000 clients.

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GLOBAL ADDRESSES

Corporate Headquarters USA
332 Jefferson Road
Rochester, NY 14623
United States of America
Phone: +1-585-340-1166

Boston
8 Faneuil Hall Marketplace
3rd Floor
Boston, MA 02109
United States of America
Phone: +1-949-813-3114

Toronto / Mississauga
2233 Argentia Road
Suites 302 & 303
Mississauga, Ontario, L5N 2X7
Canada
Phone: +1-647-542-0114

Oslo
Gjekstadveien 36
3218 Sandefjord, Norway
Phone: +47 97653546

Singapore
16 Raffles Quay, #33-03 Hong Leong
Building, Singapore 048531
Phone: +65-9450-4800

Chandigarh
Netsmartz House,
Plot no. 10, Rajiv Gandhi Chandigarh
Technology Park,
Chandigarh - 160101
Phone: +91-172-5055200

Mohali
IT-C-6, Sector 67,
Mohali – 160062,
Punjab, India
Phone: +91-172-3068070

Gurgaon
9th Floor, JMD IT Megapolis
Sector 48, Sohna Road
Gurgaon - 122001
Phone: +91-124-4978466

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