

"Quantified planet" : quand l'état du monde est surveillé en temps réel



Chris Dlugosz via Flickr CC BY 2.0

Et si les milliards de bits d'images collectés par les satellites depuis quatre décennies (ainsi que celles qu'ils continuent de prendre au quotidien) étaient analysés par une série d'algorithmes pour dresser un portrait de l'état du monde et même prédire, par exemple, quand interviendront les prochaines famines ? Un défi

'total' et gigantesque que nous présente Fast Company.

"Le bon sens est la chose au monde la mieux partagée : car chacun pense en être bien pourvu", disait entre autres choses René Descartes.

Avec un algorithme capable de déterminer le rendement des 3 millions de kilomètres carré américains de champs de maïs avec 99% de pertinence, le bon sens n'est plus le seul à compter lorsqu'il s'agit de se faire une idée du monde... Ce qui nous amène à nous demander : la Terre serait-elle finalement résumable à des bits d'information ? Lorsque l'information disponible remplit **cing pétaoctets de données (cing millions de milliards d'octets)**, la question apparaît plus que légitime...

Ce nombre, nous apprend **Fast Company**, correspond à l'archive accessible à **la start-up nord-américaine Descartes Labs**, qui prétend l'utiliser pour évaluer l'état du monde et quantifier son évolution, passée et à venir : étendue de la déforestation, plantation de nouveaux champs, ouverture de parcs éoliens, prévision sur les besoins alimentaires, apparition des sécheresses, etc. L'archive disponible, qui correspond à des images satellitaires, issues de la NASA, de son équivalent public européen ou d'autres sociétés satellitaires privées, inclut des images datant d'à peu près quatre décennies et grandit, évidemment, à chaque instant.

*"C'est simplement des données à propos du monde dans lequel on vit", dit prosaïquement Mark Johnson, qui dirige la start-up sortie du **laboratoire national de Los Alamos**.*

N'empêche, ses algorithmes entièrement automatisés analysent pixel par pixel un nombre considérable d'images, et sont capables de déterminer la santé d'un bétail donné, le nombre d'arbres d'une forêt qui ont été abattus depuis quarante ans ou encore la part d'une plantation de soja qui a déjà germé. De quoi piquer la curiosité de la **DARPA**, l'agence de recherche militaire américaine, qui a déjà investi un million et demi de dollars dans l'entreprise.

L'objectif poursuivi ? Parvenir à prédire, à partir des "patterns" identifiés, pénuries alimentaires et potentielles zones de conflits socio-politiques dans le Moyen-Orient et en Afrique du Nord. La société cherche en parallèle à démocratiser ce type de données, à destination des organisations humanitaires, des gouvernants, mais aussi de tout un chacun, via une plateforme en partie ouverte.

Et ce n'est pas fini : Descartes Labs ambitionne aussi de collecter les données de tout ce qui peut ou pourra être connecté : tracteurs, voitures, bateaux, silos à grain, etc. Le monde entier en données, en somme.

L'article de Fast Company :

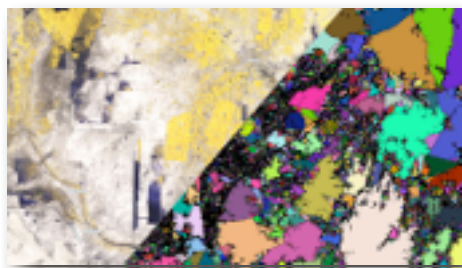


04.19.17

By John Converse Townsend

This Startup Is Building A Fitness Tracker For The Planet

Using enormous amounts of satellite data, Descartes Labs wants to track everything that's changing on Earth's surface—from deforestation to transportation to agriculture.



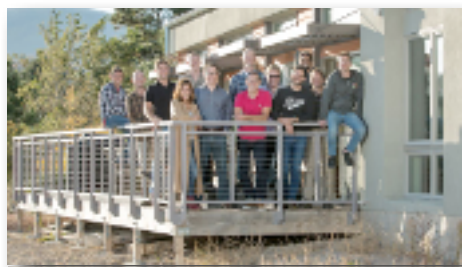
"Why the hell don't we know exactly how many trees have been cut down over the past 40 years?" [Image: courtesy Descartes Labs]

It seems like everything is tracked and measured these days.

Order a pizza, and you get a notification when it's put in the oven.

Curious about how many times an NBA player (any player) dribbles per possession? That information is neatly presented on the league's official site. Even dreams are being produced, collected, and analyzed as part of our "quantified self" data.

One startup is working on tracking something more ambitious: the planet. Instead of measuring basic heart rate or blood pressure, **Descartes Labs** is applying machine learning to both public and private satellite imagery to determine rates of deforestation, forecast food supplies, identify where new wind farms are being constructed, and more.



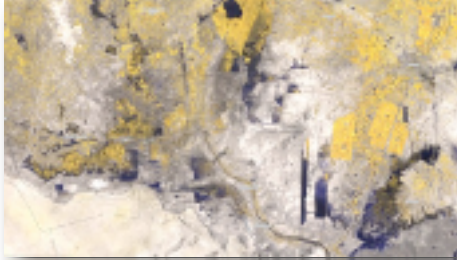
The Descartes Labs team

The company, which spun out of **Los Alamos National Lab**, has access to a massive archive of satellite imagery sourced from NASA, the European Space Agency (ESA), and other "commercial constellations." The archive goes back decades and grows larger every day—currently, it houses five petabytes of data (that's 5 million gigabytes).

"It's really an inherently good data set. It's hard to imagine that the data we're generating, like deforestation data, can be used for some sort of nefarious purpose, right? At some

point, everybody ought to know this data, because it's just data about the world we live in," CEO and cofounder Mark Johnson tells Fast Company.

Every day, *Descartes Labs*' AI reads and processes nearly five terabytes of new data, including weather readings and the latest imagery from satellites orbiting the planet. Analyzing quadrillions of pixels at a time, and comparing it to past data, its fully automated algorithms can determine, for example, whether a field is growing corn, or soy, or something else like turnips, as well as how much of it has already sprouted. Infrared readings allow the AI to determine the health of a given crop, too.



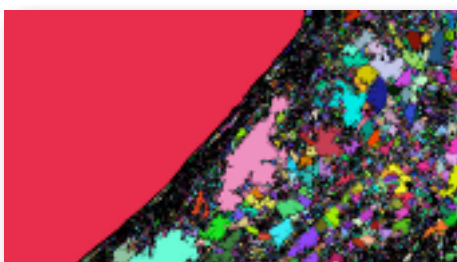
"Why the hell don't we know exactly how many trees have been cut down over the past 40 years?" [Image: courtesy Descartes Labs]

Johnson says this allows his team to accurately peer into the future of the planet. For example, *Descartes Labs* AI says it can predict the yield of America's 3 million square kilometers of cornfields with 99% accuracy.

"Investors always ask, 'What's the secret sauce on your corn model?' says Johnson. "And I always tell them, 'You won't like this, but there's no secret algorithm.' It's really that we've taken more data than anyone else, cleaned it up better than anyone else, and ran more iterations on it than anyone else."

That tool has obvious applications outside U.S. borders, too, for both governments and private companies. With the aid of a just-awarded \$1.5 million grant from the U.S. Defense Advanced Research Projects Agency (DARPA), *Descartes Labs* is now using its technology to anticipate food shortages and predict hot zones of sociopolitical conflict in the Middle East and North Africa.

"This is the kind of work we wanted to do as a company as we founded it," says Johnson. "We have 40-plus years of imagery on the planet. We can start to see, even without weather effects, how the climate has changed based on what's growing there and what's not. Drought and famine precede and oftentimes are big drivers in political instability. Better understanding those patterns is key."



"We have 40-plus years of imagery on the planet. We can start to see, even without weather effects, how the climate has changed." [Image: courtesy Descartes Labs]

Better understanding those patterns right now is critical. As many as 20 million people around world are already **on the brink of famine**, and we'll have to feed as many as 2 billion more people over the next three decades.

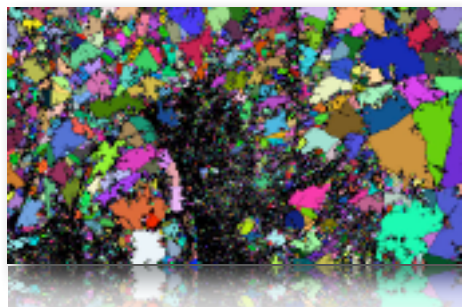
"It's much cheaper to send in humanitarian resources than troops. And nipping [causes of conflict] in the bud is not only good for the people on the ground, because they're happier and healthier, and child mortality rates goes down, but also you avoid future problems."

At the same time, *Descartes Labs* is trying to democratize its data, putting its tools in the hands of both humanitarian organizations that can intervene early enough to save lives, as well as leaders at every

level of government so that they can make better decisions about how to allocate resources. But Johnson made it clear that he wants this information to be accessible to everyone, not just people with PhDs in machine learning or elected representatives, so his 30-person team is investing in artificial intelligence that can better classify and categorize new satellite imagery as it comes in, and make it easier to read.

“What we’re focusing on is making it easy for people from the ‘outside world’ to use the infrastructure we’ve built,” he says. “ESA and NASA are both putting up lots of really interesting Earth observation satellites—tons of data is being generated. And that’s not to mention all the potential sensor data we’ll be getting from combines, tractors, cars, boats, barges, trains, ships, grain silo. Everything is going to have sensors on it, so making sense of all that data is the sort of challenge we’re aiming toward.”

Descartes Labs isn’t trying to tackle this challenge alone. As part of their push to “open up the platform,” the team was part of a [hackathon with the National Geospatial-Intelligence Agency \(NGA\)](#), where they made the platform available to participants to explore how geospatial analysis can be used to study food security.



“Everything is going to have sensors on it, so making sense of all that data is the sort of challenge we’re aiming toward.” [Image: courtesy Descartes Labs]

There are 150 million square kilometers of dry land on earth; more than twice that area is covered by water. Greater awareness of how both land and sea are managed, Johnson hopes, will foster a more symbiotic relationship, even intimacy, between human and planet. In practice, the work of *Descartes Labs*—and that of other companies like marine data analytics company [Windward](#)—might encourage businesses to restructure their value chains and even guide our global village toward new approaches to climate action.

“Why the hell don’t we know exactly how many trees have been cut down over the past 40 years? This is this is something where we have the data to answer that question,” says Johnson.

“To me, this is critical for our future on the planet right. Decisions we make now could have massive repercussions for generations to come. And I want to be armed with a massive amount of data. I want to know where we should marshal our resources to be most effective in protecting the resiliency of humanity.”

About the author

John Converse Townsend covers smart solutions to social problems as a writer and social media producer for Fast Company. He likes: black coffee, Zlatan Ibrahimovic, and long runs.

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