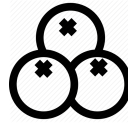# HORUS

The average acre of rainforest

$460
logging and ranching

$2,400

sustainable harvesting
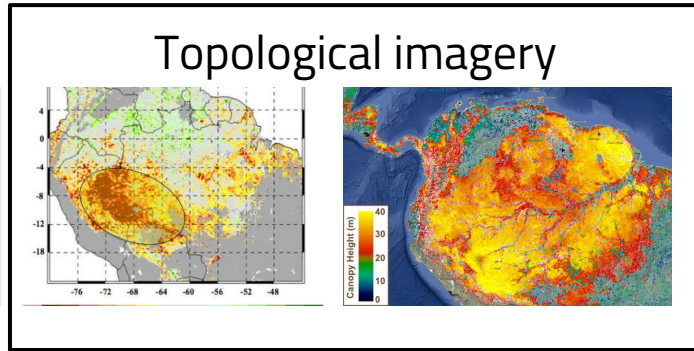
Annual Rainforest Loss

34 million acres

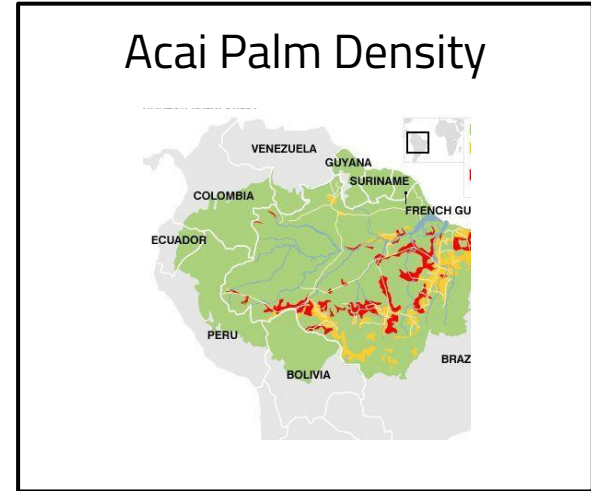Annual Market Opportunity

$66 billion

HORUS maps the distribution of plant species throughout the rainforest.

Topological imagery
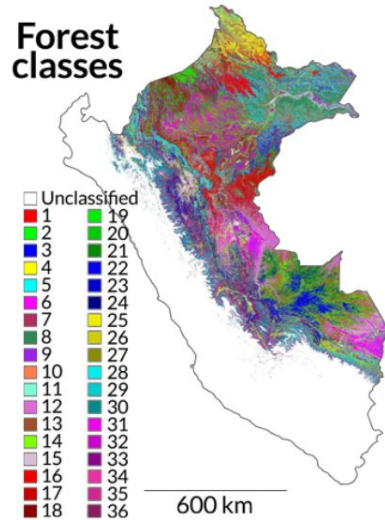
HORUS →

Acai Palm Density

HORUS INTEL enables sourcers to target land that has the highest density of valuable resources for their industry.

| HORUS
Plant distribution maps |

| Plant Use Database |

HORUS INTEL
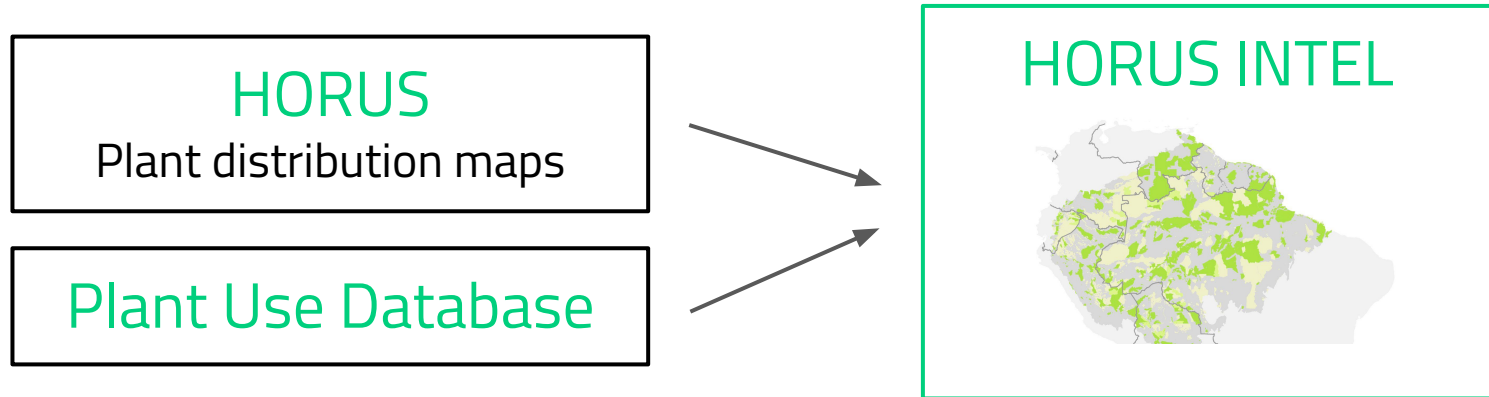
Land segments <u>are</u> customer segments

Forest classes

☐ Unclassified
■ 1   ■ 19
■ 2   ■ 20
■ 3   ■ 21
■ 4   ■ 22
■ 5   ■ 23
■ 6   ■ 24
■ 7   ■ 25
■ 8   ■ 26
■ 9   ■ 27
■ 10   ■ 28
■ 11   ■ 29
■ 12   ■ 30
■ 13   ■ 31
■ 14   ■ 32
■ 15   ■ 33
■ 16   ■ 34
■ 17   ■ 35
■ 18   ■ 36

600 km

G. Asner/Carnegie Institution for Science

i.e.
Medicinal plants - pharmaceuticals, cosmetics
Edible plants - food sourcers, grocers
Exotic and unstudied plants - botanists, scientists
etc

All necessary technical tools are available open source

Including:

- Supervised learning algorithms used:
  - (a) 3D LIDAR sensor data to identify plant species with 98% accuracy
  - (b) Multispectral sensor data to obtain canopy-rainforest floor matchup at 90% accuracy.

- Database of 250+ rainforest plants including:
  - (a) Identification: images, anatomical schematics, geographic regions, climate dependencies, etc.
  - (b) Utility: nutrition facts, harvesting practices, chemical breakdown, clinical research, medicinal uses, etc.

B2B Aerial Intel Landscape

Competitors

Farm-surveying aerial intel (Yamaha, 3D Robotics, Airware)

The Rainforest Alliance takes donations to purchase and protect areas of land

Partners

Scientists and non-profits that publish experimental data from satellites and drones

_____

Satellite image intel for up-to-date topology data (Planet, Spire)

Algo-markets to commercialize and protect IP data intelligence algorithms (Precision Hawk, DataMapper)

Customers

Medicine: Cosmetics (The Body Shop), Neuropathic Pharmacies (Twisted Thisle)

Food: Sourcers (Cacao, Coffee), Juice companies (Naked Juice - mango, Energy Drinks - guarana), Grocers (Brazil Nut, Guajava, Papaya)

Research: Pharmaceuticals, Scientists, and eventually HORUS itself

Michael Raevsky

Math and Stat Dual Degree Student, SAS and Wharton Class of 2018

Relevant Business Development Experience

Deal Flow Analyst for Wharton Angel Alumni Network

Founder and Product Manager of Root Technologies (Green Tech IoT Startup)

Relevant Engineering Experience

Data Scientist at Slice Capital (Equity Crowdfunding Startup)
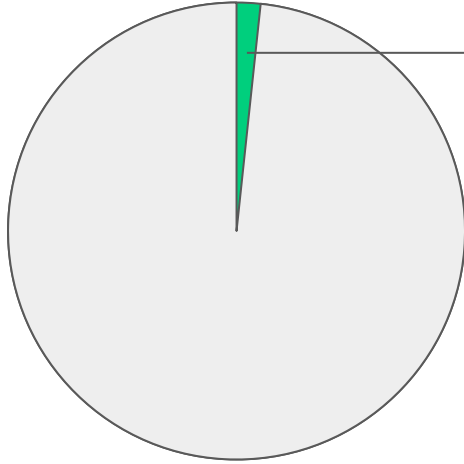
Data Mining Intern at Quant Hedge Fund, Amilar Capital

Life mission is to use technology as a means for social impact

Animal agriculture and deforestation accounts for

51% of greenhouse gas emissions.

Q&A Appendix

Training Dataset

Ex. Guarana

Family: Sapindaceae
Genus: *Paullinia*
Common Names:
Guarana, guarana
kletterstrauch,
guaranastruik,
quarana, quarane,
cupana, Brazilian
cocoa, uabano,
uaranzeiro
Part Used: Seed, fruit

TRIBAL AND HERBAL MEDICINE USES

The uses of this plant by the Amerindians predates the discovery of Brazil. South American Indian tribes (especially the Guaranis, from whence the plant's name is derived) dry and roast the seeds and mix them into a paste with water. They then use it much the same way as chocolate - to prepare various foods, drinks, and medicines. The rainforest tribes have used guaraná mainly as a stimulant and as an astringent (drying agent) for treating chronic diarrhea. It is often taken during periods of fasting to tolerate dietary restrictions better. Botanist James Duke cites past and present tribal uses in the rainforest: as a preventive for arteriosclerosis; as an effective cardiovascular drug; as an pain-reliever, astringent, stimulant, and tonic used to treat diarrhea, hypertension, fever, migraine, neuralgia, and dysentery.

Over centuries the many benefits of guaraná have been passed on to explorers and settlers. European researchers began studying guaraná (in France and Germany) in the 1940s, finding that Indians' uses to cure fevers, headaches, cramps, and as an energy tonic were well-founded. Guaraná is used and well known for its stimulant and thermogenic action. In the United States today, guaraná is reputed to increase mental alertness, fight fatigue, and increase stamina and physical endurance. Presently, guaraná is taken daily as a health tonic by millions of Brazilians, who believe it helps overcome heat fatigue, combats premature aging, detoxifies the blood, and is useful for intestinal gas, obesity, dyspepsia, fatigue, and arteriosclerosis. The plant, considered an adaptogen, is also used for heart problems, fever, headaches, migraine, neuralgia, and diarrhea. Guaraná has been used in body care products for its tonifying and astringent properties, and to reduce cellulite. Guaraná also has been used as an ingredient in shampoos for oily hair and as a ingredient in hair-loss products. In Peru the seed is used widely for neuralgia, diarrhea, dysentery, fatigue, obesity, cellulite, heart problems, hypertension, migraine, and rheumatism.

Today the plant is known and used worldwide (and is the main ingredient in the "national beverage" of Brazil: Guaraná Soda!). Eighty percent of the world's commercial production of guaraná paste is in the middle of the Amazon rainforest in northern Brazil-still performed by the Guarani Indians, who wild-harvest the seeds and process them into paste by hand. The Brazilian government has become aware of the importance of the local production of guaraná by traditional methods employed by indigenous

Main Preparation Method: infusion or capsules

Main Actions (in order):

stimulant, antioxidant, memory enhancer, nervine (balances/calms nerves), cardiotonic (tones, balances, strengthens the heart)

Main Uses:

1. as a caffeine stimulant for energy
2. as a weight loss aid (suppresses appetite and increases fat-burning)
3. for headaches and migraines
4. to tone, balance, and strengthen the heart, as a blood cleanser, and to reduce/prevent sticky blood and blood clots
5. as a refrigerant (lowers body temperature) to prevent overheating and heat stroke

Properties/Actions Documented by Research:

analgesic (pain-reliever), antibacterial, antioxidant, hyperglycemic, memory enhancer, nervine (balances/calms nerves), neurasthenic (reduces nerve pain), platelet aggregation inhibitor (to prevent clogged arteries), stimulant, vasodilator

Other Properties/Actions Documented by Traditional Use:

anticoagulant (blood thinner), antiseptic, aphrodisiac, appetite suppressant, astringent, blood cleanser, cardiotonic (tones, balances, strengthens the heart), carminative (expels gas), central nervous system stimulant, digestive stimulant, diuretic, hypotensive (lowers blood pressure), laxative, menstrual stimulant, thermogenic (increases fat-burning)

Cautions: Avoid if allergic or sensitive to caffeine.

Further down...
Plant Chemicals
Biological Activities
Clinical Research

Averages of Major Nutrients, by Forest Type

| Rainforest	Deciduous Forest
52% in Vegetation	31% in Vegetation
48% in Soil	69% in Soil

Quality of Aerial Data

Leckie et. al (2013): LIDAR + Multispectral Lidar technology has reached a point where ground and forest canopy elevation models can be produced at high spatial resolution. Individual tree crown isolation and classification methods are developing rapidly for multispectral imagery. Automated tree isolations of the multispectral imagery achieved 80%-90% good correspondence with the ground reference tree delineations based on ground data.

Asner et. al (2017):

Mapping rainforest chemistry from the air reveals 36 types of forest

Chemical signatures of the Peruvian tree canopy reveal previously unrecognized biodiversity

By LAUREL HAMERS 11:30AM, FEBRUARY 14, 2017
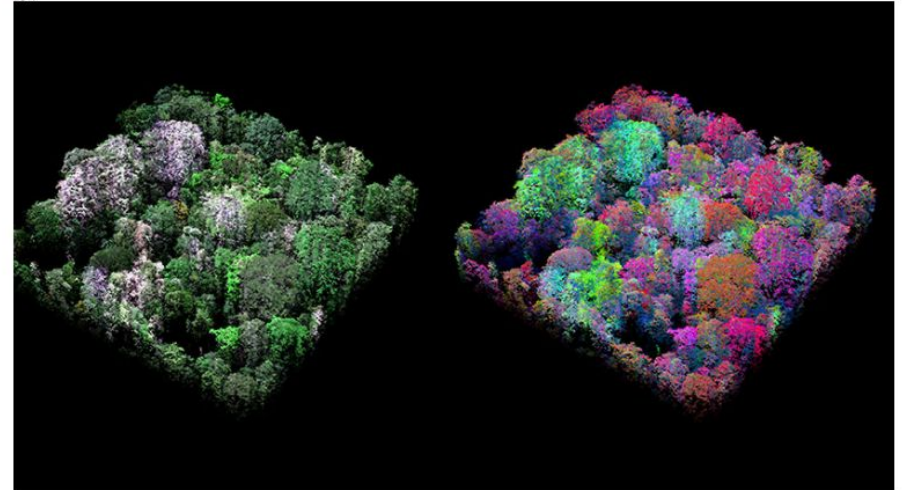
COMPLEX CANOPIES A single hectare of Peruvian tropical forest is shown in natural color (left) and in colors that correspond to as many as 23 different chemicals. The images, taken from a plane, reveal a surprising level of complexity within the forest.