Leprosy of the Land
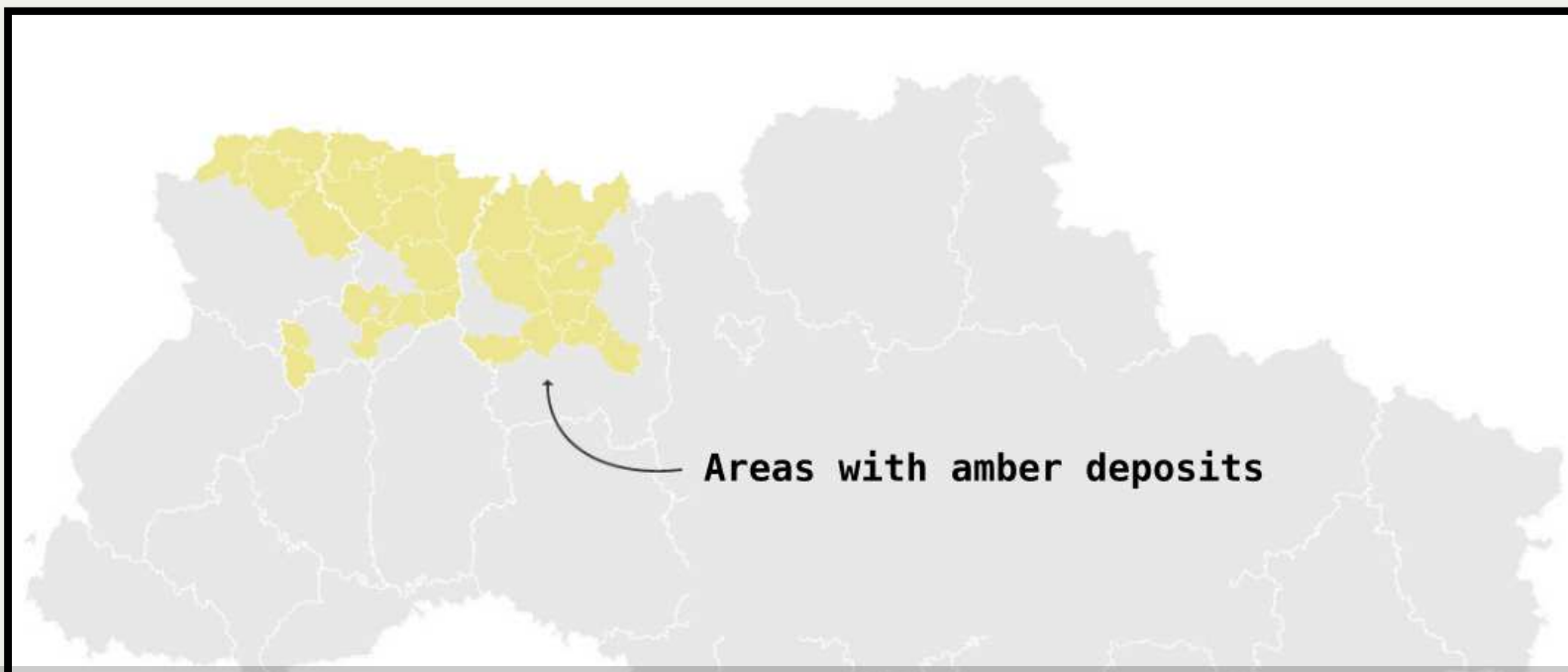
Project by Data Journalism Agency (Texty.org.ua)

Polissya, North-Western part of Ukraine

This region has large deposits of amber, close to surface

Areas with amber deposits

World prices for amber surged since 2010

In 2016 there was a three-times increase comparing to 2010

In 2012 "amber rush" started

North-Western of Ukraine became "Wild North-West"

Social and ecological disaster

At the peak of popularity, in 2016, there were about 50,000 people working for illegal amber extraction. Crimes, bribes, anarchy surged.

Lunar Klondike

Thousands of people with motorised water pumps and showels transformed land into lifeless, lunar-like landscapes

What is the real scale of the problem?

We've got some reports and scary pictures, but not much reliable info

What is the real scale of the problem, 2?

Total area of a region is about 75,000 km, the size of Czech Republic

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Could we use satellite images?

After research, we found we need only high resolution images: 0.8 m per pixel (biggest zoom from online map). Price for half-a-year old images for this area would be ~1 million US dollars

Is there another option?

Yes, online map services like Google or Mapbox have a decent satellite photos, aged 2—5 years

Bing maps

Best option in our case – most of photos were made in 2015, some in 2014 and 2016 – these were years with most intensive extraction of amber

What to do with half a million of images?

The only option in our case – create a computer model to search authomatically for traces of amber extraction, on all this huge amount of photos

Computer model

Deep Neural Network — model is based on recent advances in Artificial Intelligence (AI)

What to look on satellite photos?

We made a couple of interviews with environmental activists, to figure how places of amber extraction could look on aerial images

Learn by example

We manually selected two initial set of images: with amber extraction and without it (positive and negative examples). Totally there were couple of thousands of examples, but with smaller images

Learn by example, 2

We programmed a computer model, and trained it on those initial set of images

Automatic search

It took approximately 60 hours for our model to process all images.We created interactive, online map with all places found

Not quite correct

First version of model misclassified about 20% of all found extraction places:we were corrected by early users of our map. We re-trained our model using new set of initial images (we excluded photos with specific type of deforestation, from our initial training set, which looks similar to amber mining)

Current version

So in our project we created first, most complete interactive map of illegal amber extraction. We did a first reliable estimation of impacted area, too (thousands of hectares)

Design, 1

We decided to intermix images of amber extraction with text from our article. Tetris-like images flow with a text of an article and finally got a place on main interactive map on the bottom of page

Leprosy of the land

THOUSANDS HECTARES OF LAND TURNED INTO LUNAR LANDSCAPES DUE TO ILLEGAL AMBER MINING. OUR MACHINE MODEL FOUND TRACES OF SUCH ACTIVITY ON SATELLITE IMAGES FOR THE AREA OF 70,000 SQUARE KM.

Illegal extraction of gemstones provide "jobs" to thousands of people who live near such deposits in Volyn, Zhytomyr, and most of all, in Rivne region of a country.

A few decades ago one could hardly imagine how to make profit out of the "solar stone". In the past people could dig up amber in their backyards and burn it in stoves as a fuel for house heating.

Everything changed in 2012-13. The town hotels of Rivnenska oblast have never seen so many Chinese people before. Foreigners brought currency and smuggled the amber back to China. The Chinese buyers paid generously, so the amber mining got mechanized — shovels gave way to power pumps. 2014-2016 became the golden years for amber diggers leading to environmental disaster.

All pictures in this article are the satellite images of amber mining sites. You could click on each image to see the area on the map

Ukraine has a world amber market share of 30-40%, it is from 250 to 350 tons.

Around 50 000 of Ukrainians are engaged in illegal amber mining.

Design, 2

We decided to interactively blend text of article with a map images, too – to make transitions between map and text most natural for the reader. Click on any of images in article and you will be transferred to corresponding place from map. After using map you could return to the same place in article.

click me ⟩

Leprosy
of the land
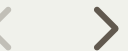
Open & reproducible methodology

We open-sourced our methodology and published computer code needed to train similar models to find any places of interests on satellite/aerial images

Reception

Project was cited as visualization of the month by Visualisingdata.com and Global Investigative Journalism Network

Reception, 2

We started new wave of discussion about this problem and with a help of activists and environmental experts we produced policy brief with recommendation how to approach this problem, ie easy licensing, developing of local amber market etc

Reception, 3

Despite amber extraction is decreased in last two years, anyway the scale of this still very big.

Who we are

Data Journalism Agency (or Texty.org.ua): is a small online media (ten people in newsroom) from Kyiv, Ukraine, specializing in data journalism

The End

Thank you for attention!