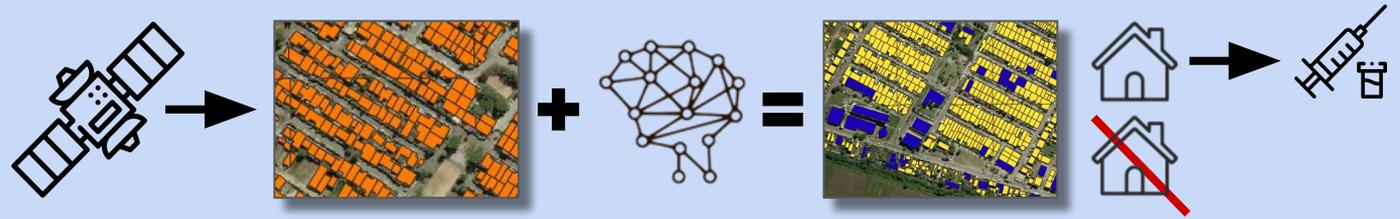




Sat-Trac

How do we **improve immunisation** rates by **predicting** where vaccines are **needed** the most?

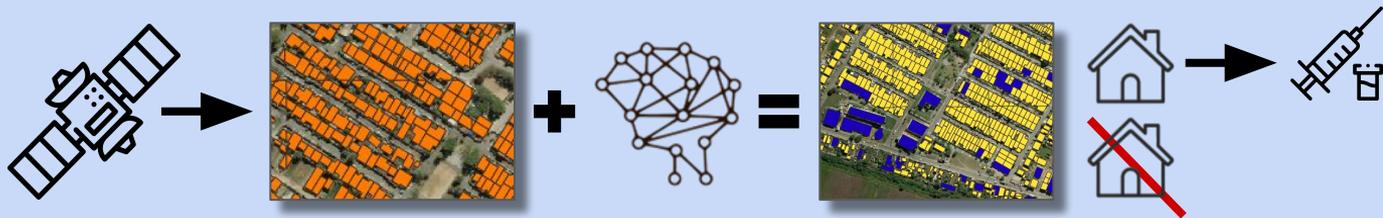


The Challenge

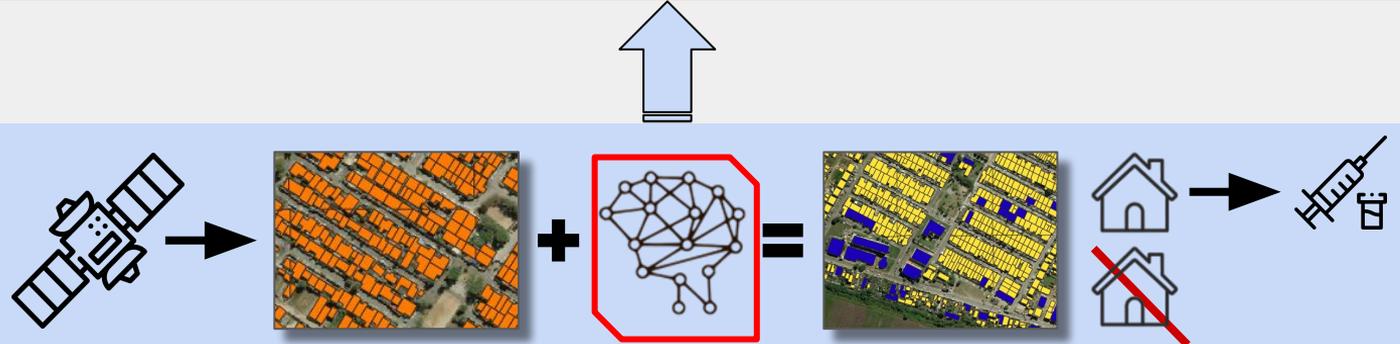
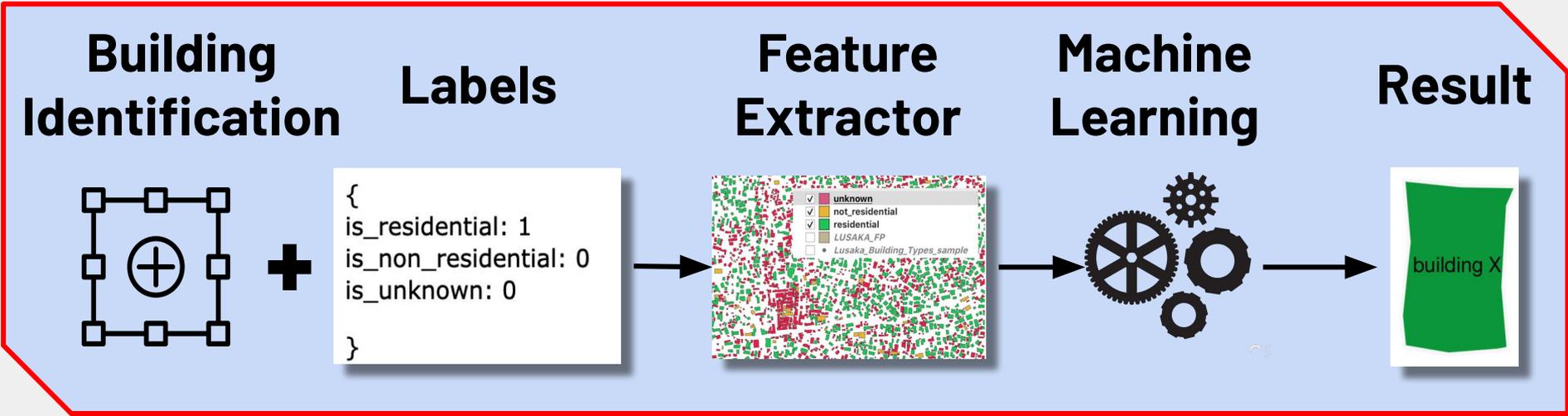


To **improve population estimates** through **automating building classification** by type

- A critical step in achieving immunisation
- Targeting Zambia for development
- Using **open source** software and **available datasets**
- Developing a **tool** that is transferable across applications & regions



Our Solution



Tech demo!



The screenshot displays a GIS application interface. On the left, there is a 'Browser' panel with a tree view of data sources including Favorites, Spatial Bookmarks, Project Home, Home, GeoPackage, SpatialLite, PostGIS, MSSQL, DB2, WMS/WMTS, Vector Tiles, XYZ Tiles, Google Maps Satellite only, Google Satellite Hybrid (selected), and OpenStreetMap. Below the browser is a 'Layers' panel with a legend. The legend includes categories like residential (green), unknown (blue), not_residential (red), and footprints (checked). Under footprints, there are sub-items: residential copy (checked), unknown copy (checked), and not_residential copy (checked). Other layers include BlackMarble_2016_3km_geo, buildingtypes_epsg4326_buil, ZMB_population_v1_0_gridd, 0.0614, 708.758, Lusaka (checked), Google Maps Satellite only, Google Satellite Hybrid (selected), and OpenStreetMap. The main map area shows an aerial satellite view of a city with numerous blue polygons overlaid on the buildings, representing the 'unknown' or 'footprints' data layers.

Next Steps



- Data refinement and model improvement
- Volumetric estimations of residential buildings
- Road quality mapping
- Enhanced spatial population prediction
- Enabling the equitable access of infrastructure
- Predicting healthcare facility locations



Thanks to our Sponsor!



WHO GIS group - Advisors

- Ravi Shankar, Daniel Obare, Adam McKay, Prashant Hedao and team

CDC - Satellite image data

- Brian Kaplan

Gates Foundation - Advisors

- Rhiannan Price, Chris Minkar and Sessie Burns

Classification with a boosted tree

Features extracted from each individual footprint

- Footprint of the Building (area)
- Number of Neighbors (30 metre radius)
- Average Area of Neighbors (30 metre radius)
- Length of Building
- 'Squareness' (via Convex Hull)

Business Roadmap



Funding & Supports



Governmental healthcare providers



Non-Governmental Organizations (NGOs)



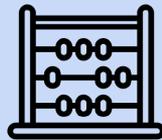
Service provider



SAT-TRAC



Applications (End Users)



Population Counts



Vaccine Distribution



AID Delivery

Zambia



Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help

Browser

- Favorites
- Spatial Bookmarks
- Project Home
- Home
- GeoPackage
- SpatialLite
- PostGIS
- MSSQL
- DB2
- WMS/WMTS
- Vector Tiles
- XYZ Tiles
 - Google Maps Satell
 - Google Satellite Hyl
 - OpenStreetMap
- WCS
- WFS / OGC API - Featur
- OWS
- ArcGIS Map Service

Layers

- boosted_tree
 - residential
 - not_residential
 - raw_labels
 - raw_footprints
 - labelled_footprints
 - residential
 - not_residential
 - unknown
 - night_light
 - world_pop
 - 708.758
- WHO
- Google Maps Satell
- Google Satellite Hyl

Type to locate (Ctrl+K)

Coordinate 4224205,-1909659 Scale 1:5976652 Magnifier 100% Rotation 0,0° Render EPSG:3857

Lusaka



A screenshot of the QGIS desktop application. The interface includes a menu bar at the top with options like Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Mesh, Processing, and Help. Below the menu is a toolbar with various icons for map navigation and editing. On the left side, there are two panels: 'Browser' and 'Layers'. The 'Browser' panel shows a tree view of data sources, including Favorites, Spatial Bookmarks, Project Home, Home, and various data providers like GeoPackage, SpatialLite, PostGIS, MSSQL, DB2, WMS/WMTS, Vector Tiles, and XYZ Tiles (Google Maps Satellite, Google Satellite Hy, OpenStreetMap). The 'Layers' panel shows a list of loaded layers with checkboxes and color swatches. The main map area displays a satellite view of a city, with several layers overlaid: 'boosted_tree' (green), 'residential' (yellow), 'not_residential' (purple), 'raw_labels', 'raw_footprints', 'labelled_footprints' (yellow, purple, black), 'night_light', 'world_pop', '0.0614', '708.758', and 'WHO'. At the bottom, there is a search bar with the text 'Type to locate (Ctrl+K)' and a status bar showing the current coordinate (3156689, -1726225), scale (1:186770), magnifier (100%), rotation (0,0 degrees), and other settings.

Lusaka (raw)



The screenshot shows the QGIS desktop environment. The main window displays a satellite image of Lusaka, Zambia. A specific area in the center of the city is highlighted in yellow, representing residential land. The interface includes a menu bar at the top with options like Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Mesh, Processing, and Help. Below the menu is a toolbar with various icons for map navigation and analysis. On the left side, there are two panels: 'Browser' and 'Layers'. The 'Layers' panel shows a list of layers with checkboxes and color swatches. A legend at the bottom left of the map area provides a key for the colors: yellow for 'residential', purple for 'not_residential', and black for 'unknown'. The status bar at the bottom of the window displays the current coordinate (3173540, -1747870), scale (1:186770), magnifier (100%), rotation (0,0 degrees), and the EPSG coordinate system (EPSG_3857).

Lusaka (BDT)



The screenshot displays the QGIS desktop environment. The main map area shows a satellite view of Lusaka, Zambia, with a semi-transparent vector layer overlaid. This layer uses a color-coded scheme to identify residential areas (yellow) and non-residential areas (purple). The interface includes a top menu bar with options like Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Mesh, Processing, and Help. Below the menu is a toolbar with various GIS tools. On the left side, there are two panels: the 'Browser' panel, which lists data sources such as GeoPackage, SpatialLite, PostgreSQL, MSSQL, DB2, WMS/WMFS, Vector Tiles, and XYZ Tiles (including Google Maps Satellite, Google Satellite Hybrid, and OpenStreetMap); and the 'Layers' panel, which shows the current map layers. The 'Layers' panel includes a legend for the 'boosted_tree' layer, with categories for 'residential' (yellow), 'not_residential' (purple), and 'unknown' (black). A search bar at the bottom left contains the text 'Type to locate (Ctrl+K)'. The bottom status bar shows the current coordinate (3161828,-1727214), a scale of 1:186770, a magnifier of 100%, a rotation of 0.0 degrees, and the EPSG_3857 projection.

Lusaka



The screenshot displays the QGIS desktop environment. The main window shows a satellite view of Lusaka, Zambia. On the left, the 'Browser' panel lists data sources such as 'Google Maps Satellite' and 'OpenStreetMap'. The 'Layers' panel on the left shows a list of vector layers, including 'boosted_tree', 'residential', 'not_residential', 'raw_labels', 'raw_footprints', 'labelled_footprints', 'night_light', 'world_pop', and '0.0614'. The 'WHO' layer is currently selected and highlighted in blue. The top menu bar includes 'Project', 'Edit', 'View', 'Layer', 'Settings', 'Plugins', 'Vector', 'Raster', 'Database', 'Web', 'Mesh', 'Processing', and 'Help'. The bottom status bar shows the coordinate '3143170,-1737168', a scale of '1:11673', a magnifier of '100%', and a rotation of '0,0 °'. The bottom left search bar contains the text 'Type to locate (Ctrl+K)'. The bottom right corner of the status bar shows 'Render', 'EPSG_3857', and a small chat icon.

Lusaka (raw, zoomed)

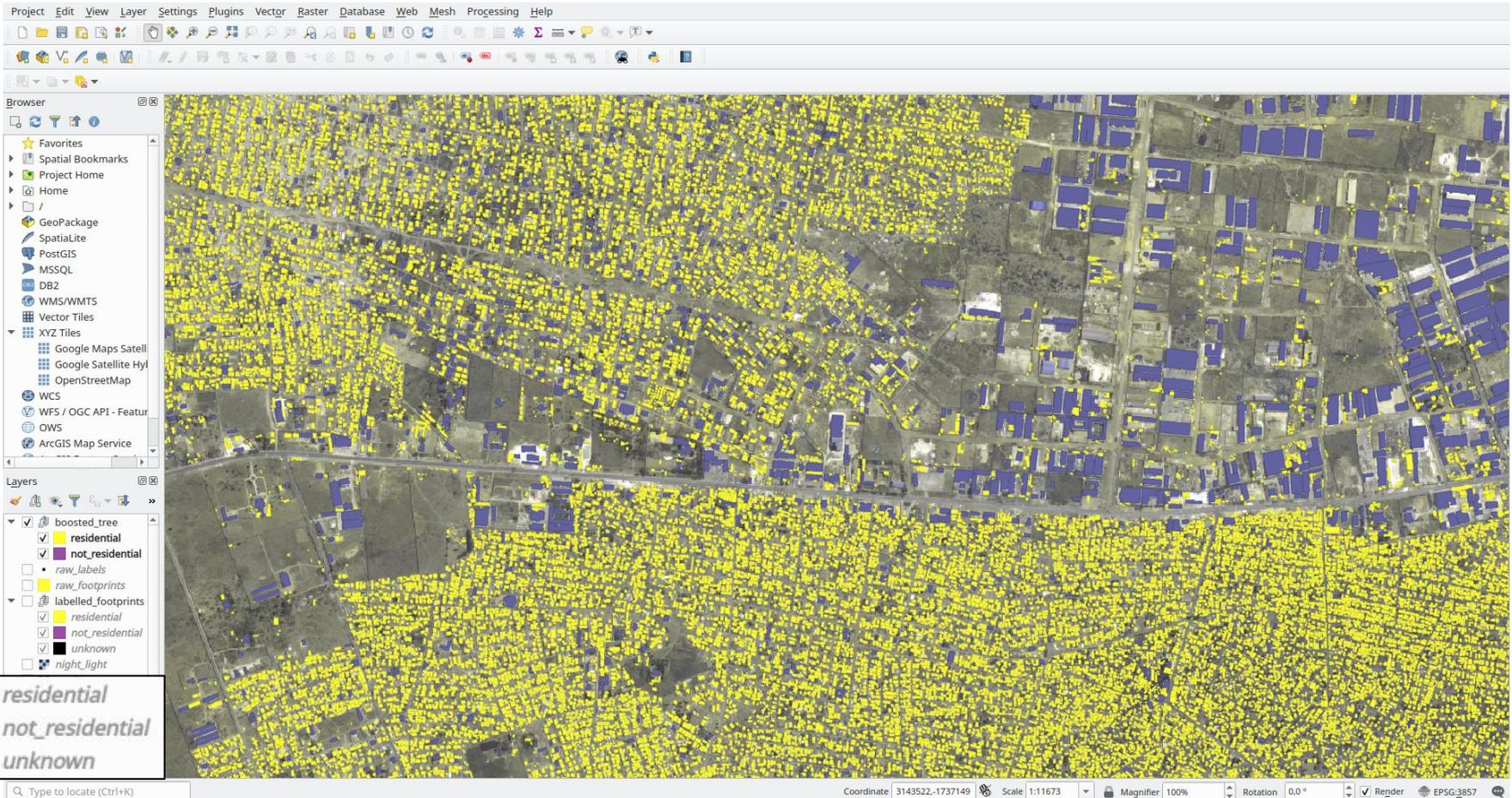


The screenshot displays the QGIS desktop environment. The main map area shows a high-resolution satellite image of a city area, with numerous small yellow and purple rectangles overlaid, representing residential labels. The interface includes a menu bar at the top with options like Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Mesh, Processing, and Help. Below the menu is a toolbar with various icons for map navigation and editing. On the left side, there is a 'Browser' panel showing a tree view of data sources, including Favorites, Spatial Bookmarks, Project Home, Home, GeoPackage, SpatialLite, PostGIS, MSSQL, DB2, WMS/WMTS, Vector Tiles, XYZ Tiles, Google Maps Satellite, Google Satellite HyL, OpenStreetMap, WCS, WFS / OGC API - Featur, OWS, and ArcGIS Map Service. Below the browser is a 'Layers' panel showing a list of layers with checkboxes and color swatches. At the bottom, there is a search bar with the text 'Type to locate (Ctrl+K)' and a status bar displaying 'Coordinate 3144279,-1738252', 'Scale 1:11673', 'Magnifier 100%', 'Rotation 0,0 °', 'Render', and 'EPSG_3857'.

residential
 not_residential
 unknown

Coordinate 3144279,-1738252 Scale 1:11673 Magnifier 100% Rotation 0,0 ° Render EPSG_3857

Lusaka (BDT, zoomed)



The screenshot displays the QGIS interface with a satellite view of Lusaka. The map is overlaid with a dense layer of yellow and purple labels, representing residential and non-residential buildings respectively. The interface includes a menu bar at the top, a toolbar, a Browser panel on the left, and a Layers panel at the bottom left. A legend in the bottom left corner identifies the labels: yellow for residential, purple for not_residential, and black for unknown. The status bar at the bottom shows the coordinate system as EPSG:3857 and the scale as 1:11673.

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help

Browser

- ★ Favorites
- ▶ Spatial Bookmarks
- ▶ Project Home
- ▶ Home
- ▶ /
- ▶ GeoPackage
- ▶ SpatialLite
- ▶ PostGIS
- ▶ MSSQL
- ▶ DB2
- ▶ WMS/WMTS
- ▶ Vector Tiles
- ▶ XYZ Tiles
 - ▶ Google Maps Satellite
 - ▶ Google Satellite Hyl
 - ▶ OpenStreetMap
- ▶ WCS
- ▶ WFS / OGC API - Featur
- ▶ OWS
- ▶ ArcGIS Map Service

Layers

- ▶ boosted_tree
 - residential
 - not_residential
 - raw_labels
 - raw_footprints
- ▶ labelled_footprints
 - residential
 - not_residential
 - unknown
 - night_light

residential
 not_residential
 unknown

Type to locate (Ctrl+K)

Coordinate 3143522,-1737149 Scale 1:11673 Magnifier 100% Rotation 0,0° Render EPSG:3857

Tech demo!



Truth data labels

Tech demo!



Residential

Non-residential

Unknown

Thanks for Listening! Questions?



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