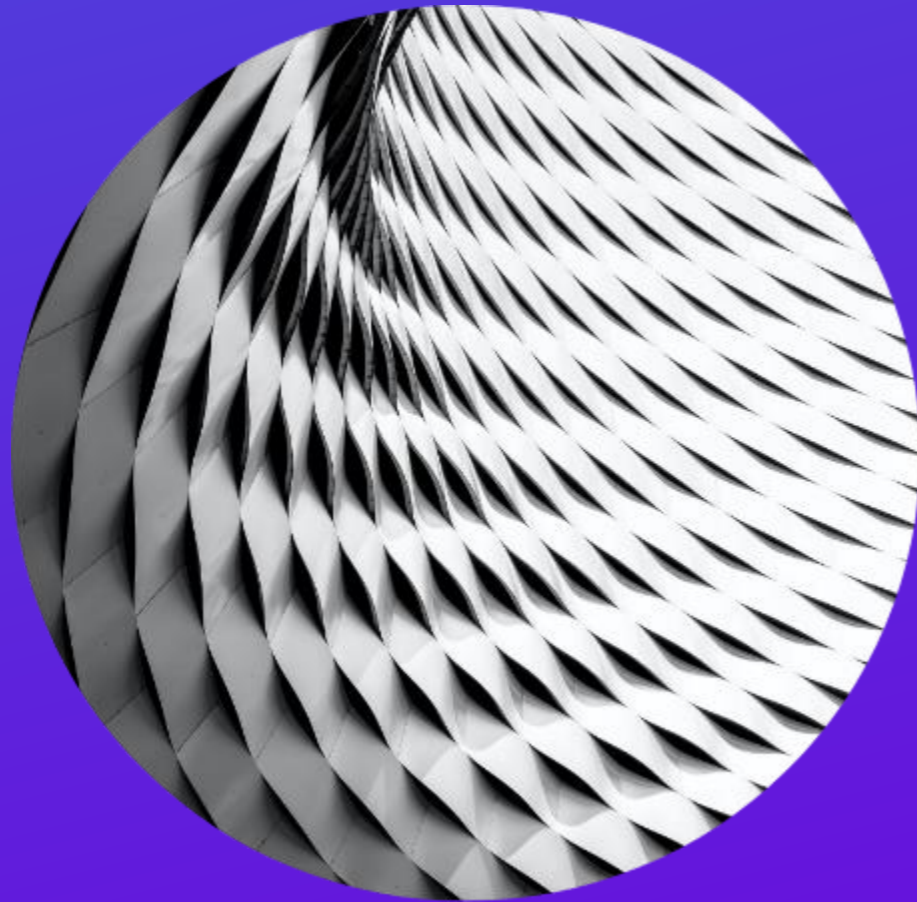


REMTECH 2021, BANFF
FRIDAY, OCTOBER 15TH - TECHNOLOGY



Cloud Computing Technology

New and Innovative
Approaches to Big Data

**Khalid Lemzouji
& Peter Solymos**



analythium.io

The Management Triangle



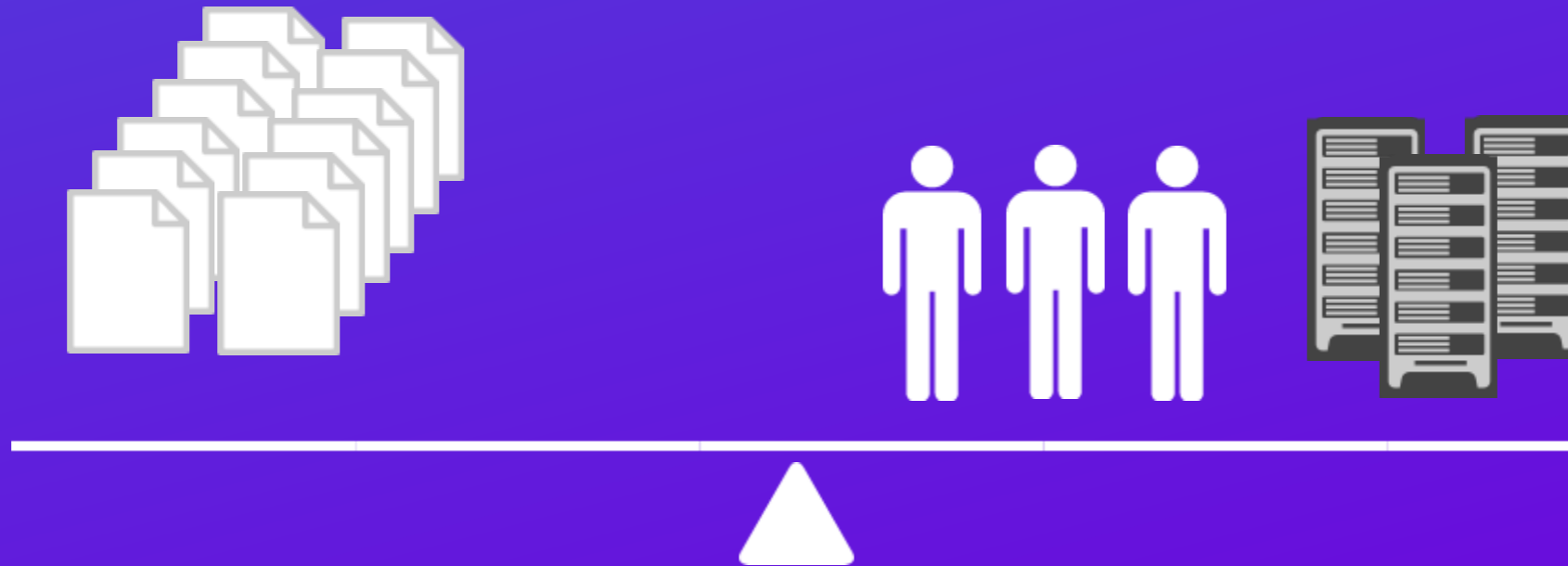
You Have to Balance the Scale



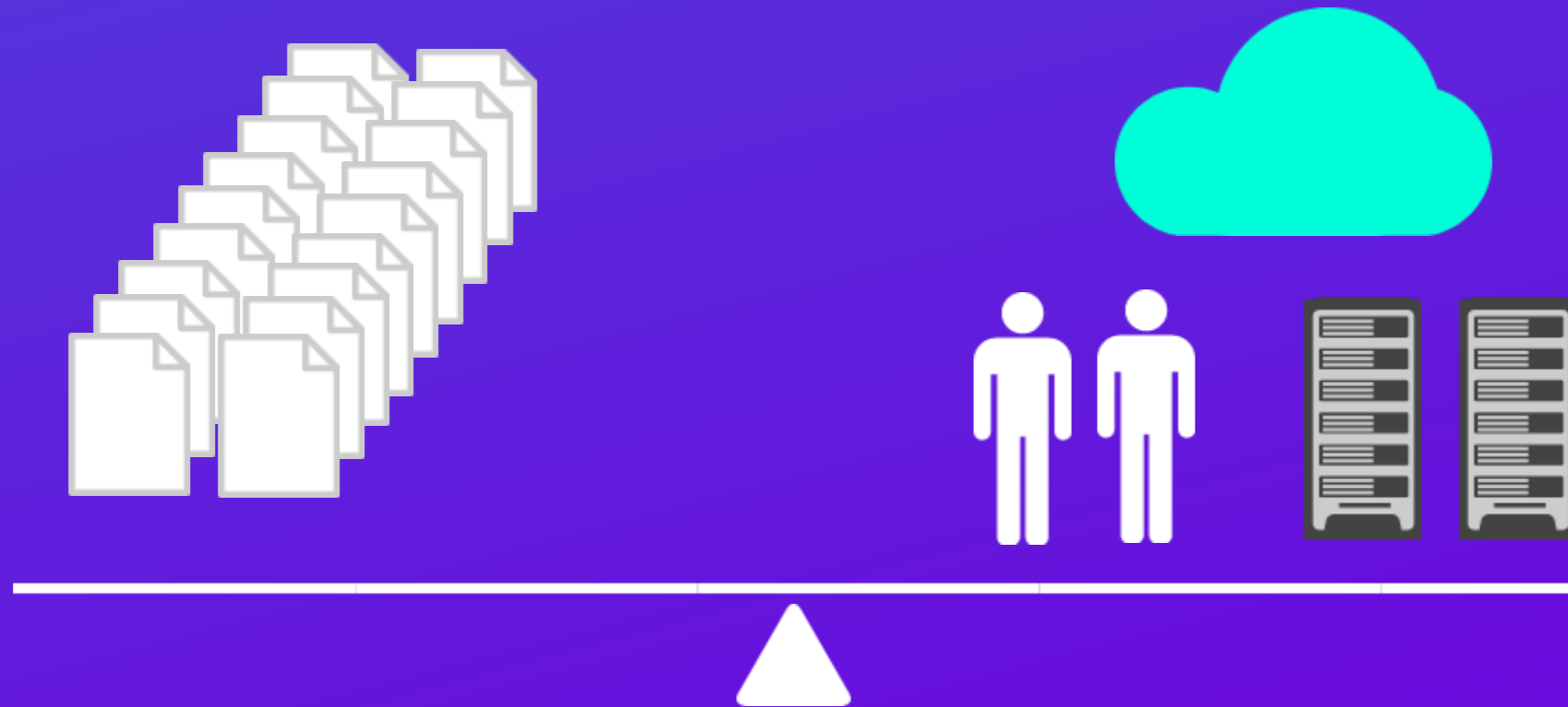
More Data = More Spending ???

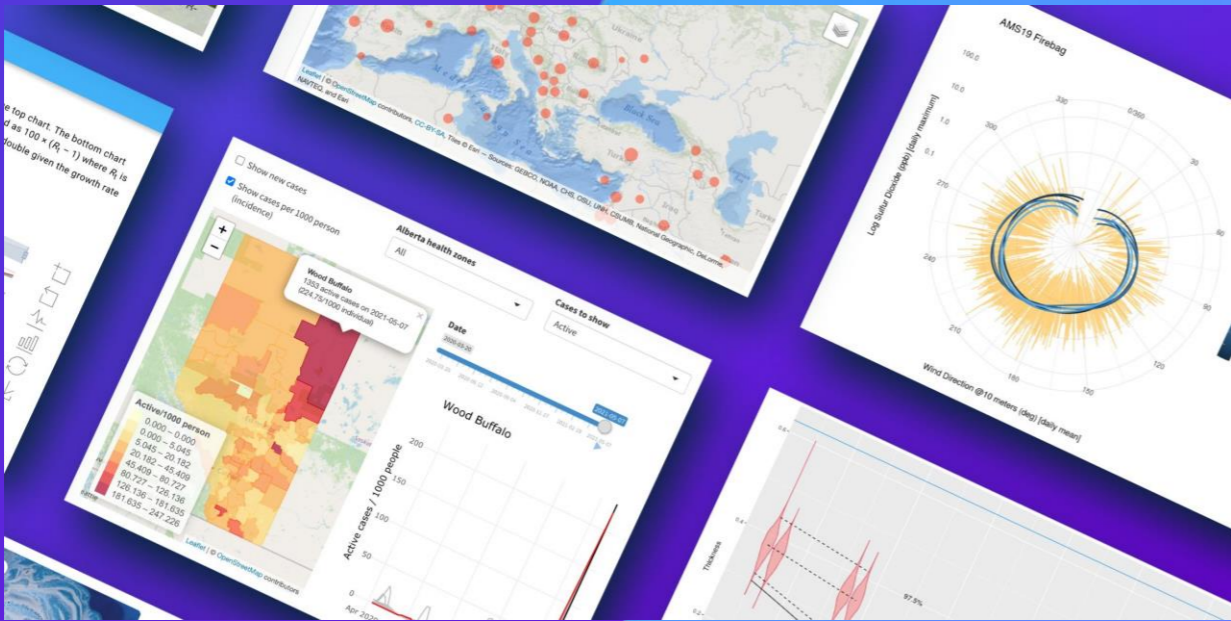


Do You Have the Budget?



The Cloud Can Be Your Unfair Advantage





Example #1

COVID 19

hub.analythium.io/covidapp

COVID 19 App

Fully Automated System

Wide format

Province	lat	long	2019-01-01	2019-02-01	2019-03-01	2019-04-01	2019-05-01	2019-06-01	2019-07-01	2019-08-01	2019-09-01	2019-10-01	2019-11-01	2019-12-01
Alberta	51.0453	-115.7580	0	0	0	0	0	0	0	0	0	0	0	0
British Columbia	49.2827	-123.1207	0	0	0	0	0	0	0	0	0	0	0	0
Manitoba	49.8153	-97.1384	0	0	0	0	0	0	0	0	0	0	0	0
Ontario	43.2637	-79.8650	0	0	0	0	0	0	0	0	0	0	0	0
Quebec	45.5017	-73.5693	0	0	0	0	0	0	0	0	0	0	0	0
Saskatchewan	49.8133	-100.0408	0	0	0	0	0	0	0	0	0	0	0	0
Yukon	64.2563	-135.0031	0	0	0	0	0	0	0	0	0	0	0	0

Long format

province	date	update	confirmed	deaths	recovered	total
Ontario	31-01-2020		3	0	0	3
Colombie-Britannique	31-01-2020		1	0	0	1
Canada	31-01-2020		4	0	0	4
Ontario	08-02-2020		3	0	0	3
Colombie-Britannique	08-02-2020		4	0	0	4
Canada	08-02-2020		7	0	0	7
Ontario	16-02-2020		3	0	0	3
Colombie-Britannique	16-02-2020		5	0	0	5
Canada	16-02-2020		8	0	0	8
Ontario	21-02-2020		3	0	0	3
Colombie-Britannique	21-02-2020		6	0	0	6
Canada	21-02-2020		9	0	0	9
Ontario	28-02-2020		4	0	0	4
Colombie-Britannique	28-02-2020		6	0	0	6
Canada	28-02-2020		10	0	0	10
Ontario	25-02-2020		6	0	0	6
Colombie-Britannique	25-02-2020		7	0	0	7
Canada	25-02-2020		11	0	0	11
Ontario	26-02-2020		5	0	0	5

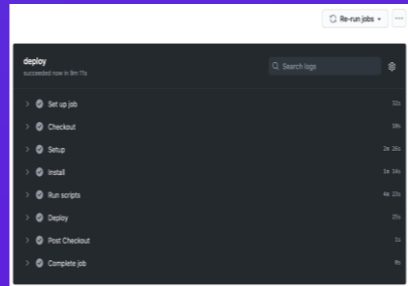
Unstructured

```
class Figure:
    """Figure class"""
    def __init__(self, data):
        self.data = data
        self.plot()

    def plot(self):
        """Plot the data"""
        plt.figure(figsize=(10, 5))
        plt.plot(self.data)
        plt.title('COVID-19 Data')
        plt.xlabel('Date')
        plt.ylabel('Cases')
        plt.show()

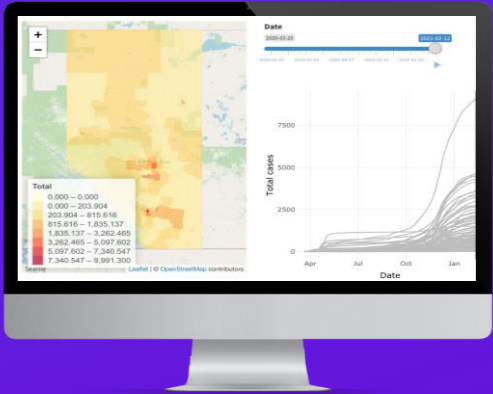
# Example usage
data = {'date': '2020-01-01', 'cases': 0}
figure = Figure(data)
figure.plot()
```

Data sources



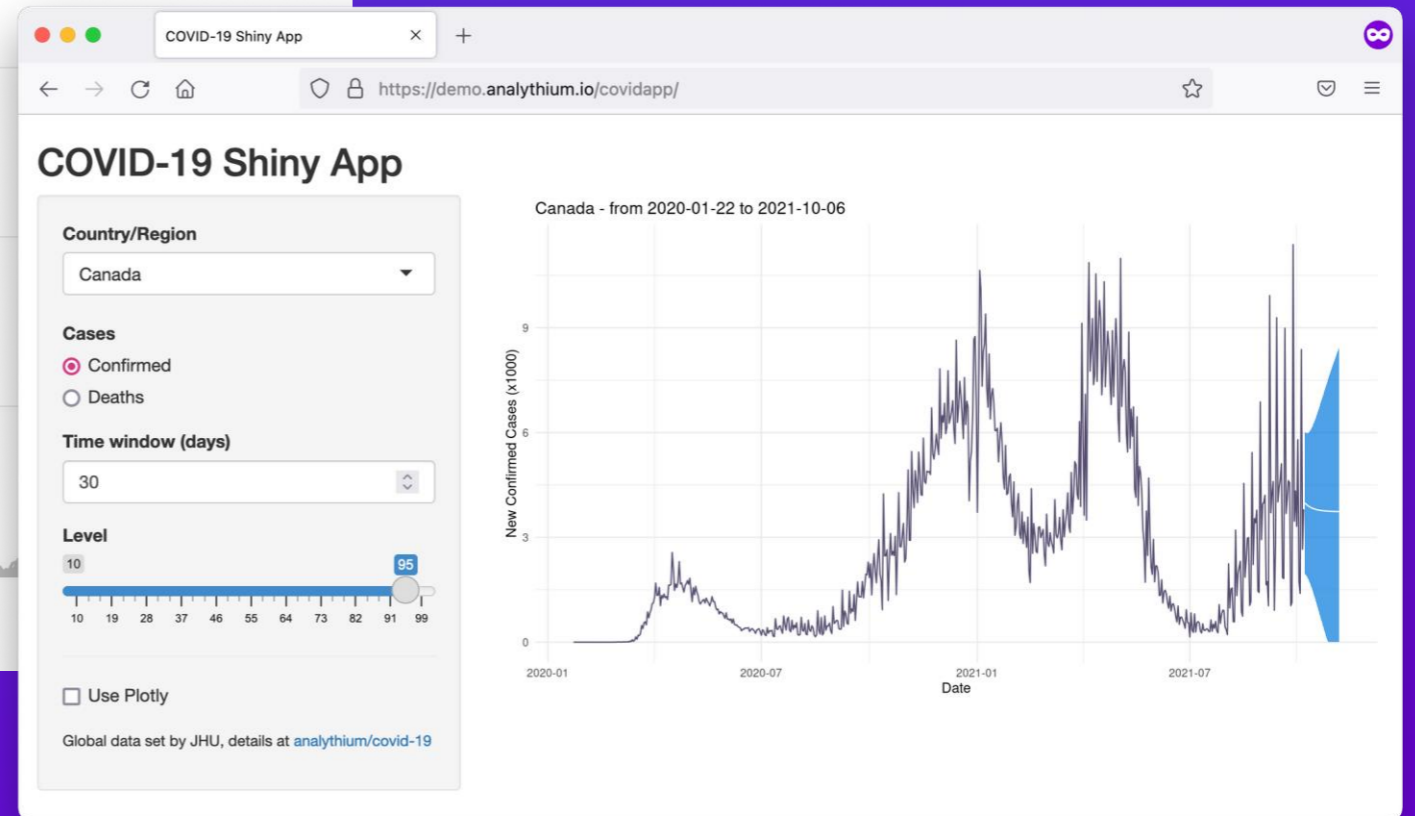
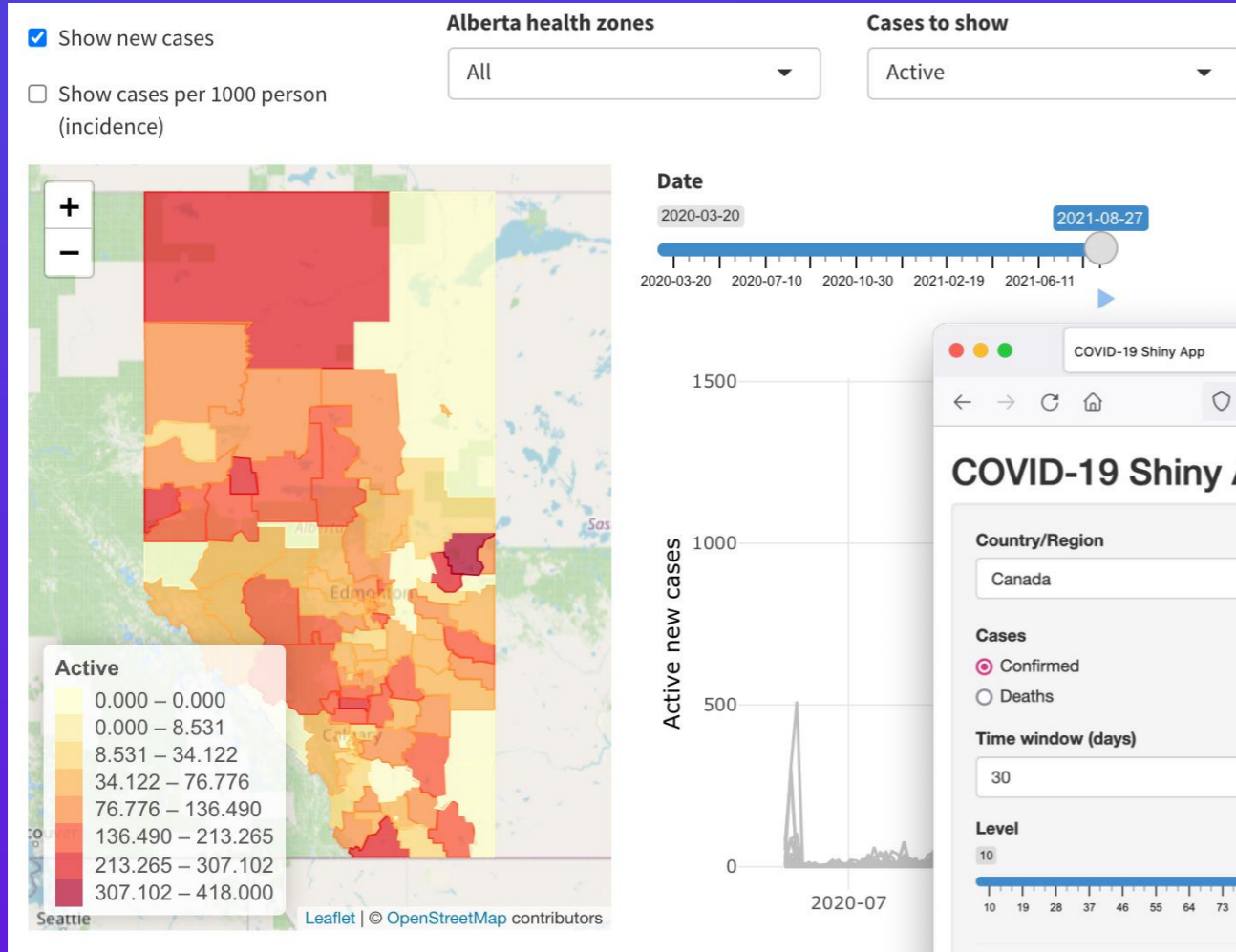
Standardization
Forecasting
Deployment

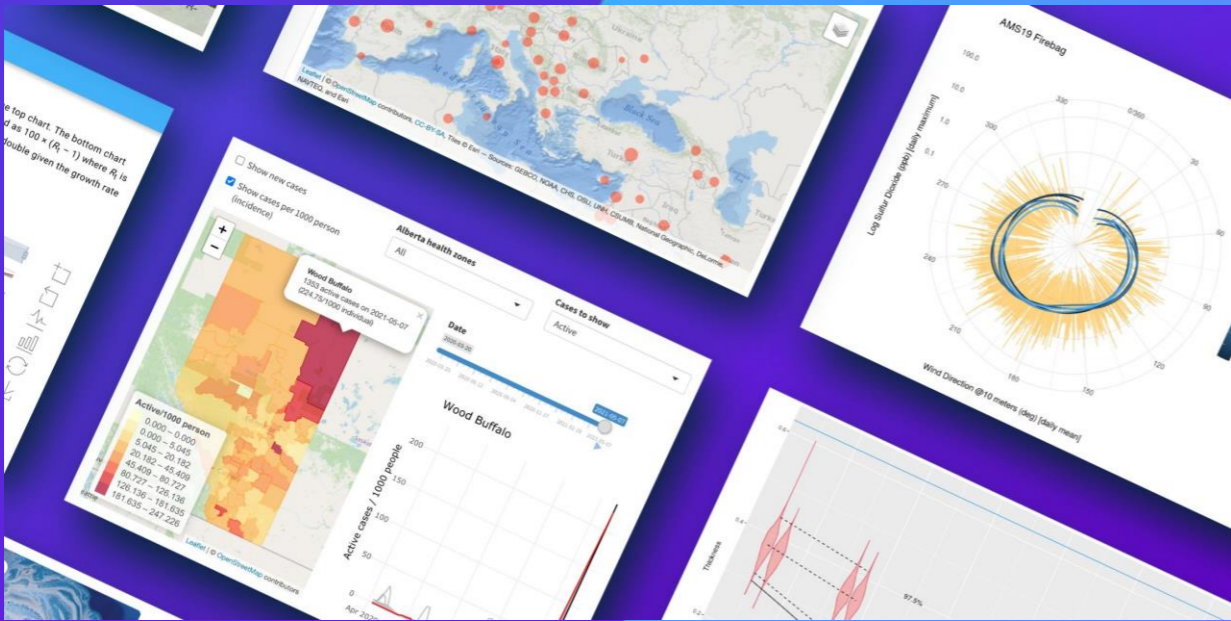
Automation



API + Web apps

Interactivity + Forecasting





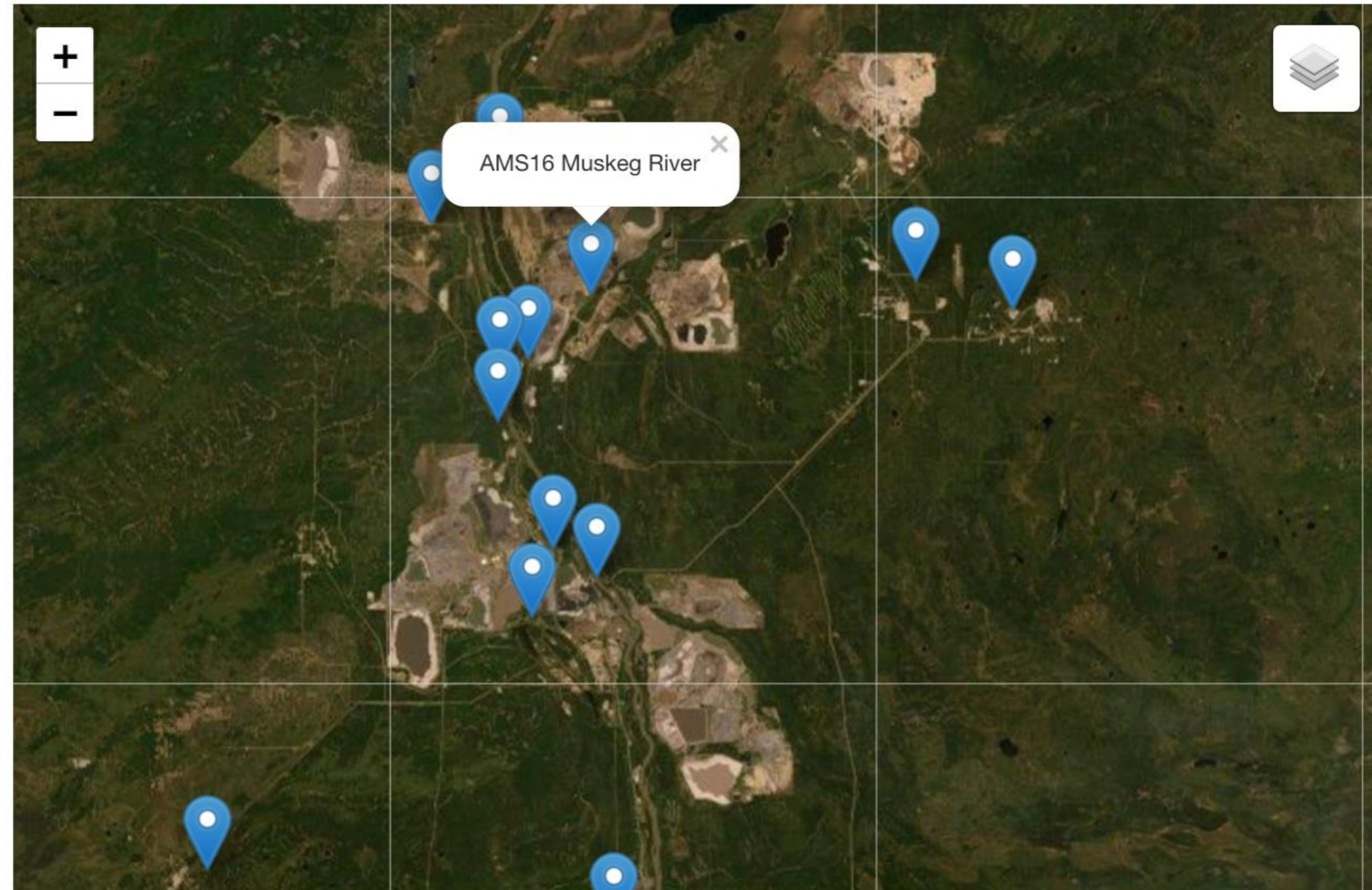
Example #2

Air Quality

blog.analythium.io/multivariate-air-quality-data-exploration/

Select a site

Click on a pin in the map to select air quality monitoring site.



Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community

Hundreds of thousands of data points

Large number of variables collected

Streaming sensor data

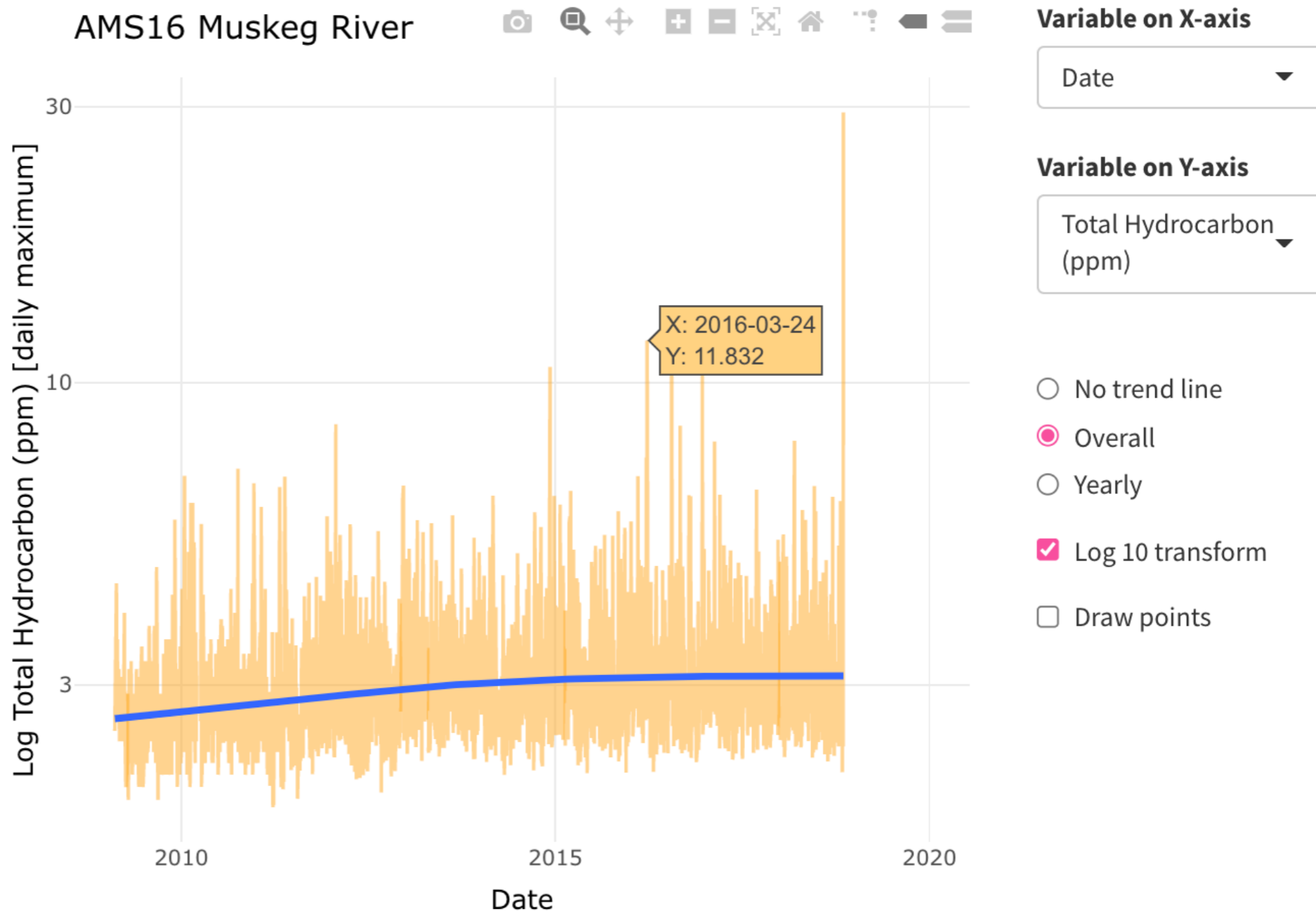
Interactive
visualization

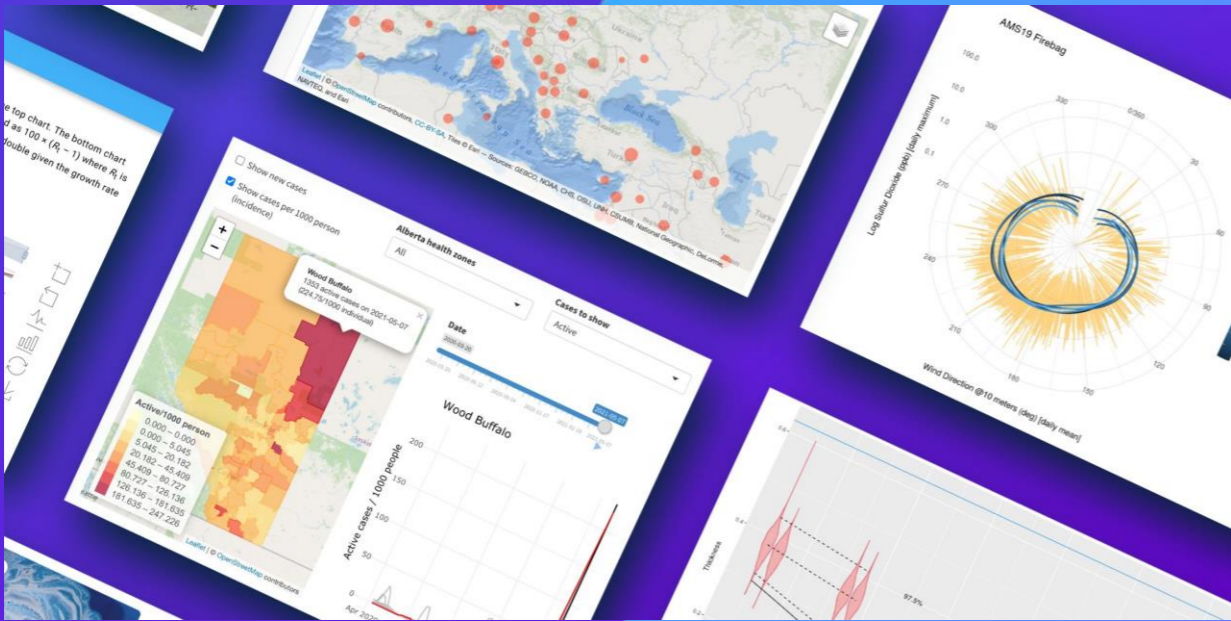
Build your own
graph

Build intuitive
understanding
quickly

Now it's your turn!

Select variables and change settings to explore relationships.





Example #3

Adaptive Sampling

Yukon Government

Moose Abundance

Helicopter surveys

Adaptive sampling to
improve estimates

Extrapolate to
unsurveyed areas

Update hunting quotas



Home

Settings

Data

Explore

Total

Documentation

Data

Choose Survey CSV File

Browse...

MayoMMU_QuerriedData.cs

Upload complete

Omit variables with too few surveyed levels

Convert integer to categorical

Filter data

Survey Name (**SURVEY_NAM**)Yukon Territory Region (**YT_REGION**)

Interactive table

Data Structure

Show 10 entries

Search:

	SURVEY_NAM	YT_REGION	SURVEY_YEA	SURVEY_ID	S_SET
1	Mayo	Northern Tutchone	2017	1	
2	Mayo	Northern Tutchone	2017	1	
3	Mayo	Northern Tutchone	2017	1	
4	Mayo	Northern Tutchone	2017	1	
5	Mayo	Northern Tutchone	2017	1	
6	Mayo	Northern Tutchone	2017	1	

- Home
- Settings
- Data
- Explore
- Univariate
- Multivariate
- Total
- Documentation

Univariate Exploration

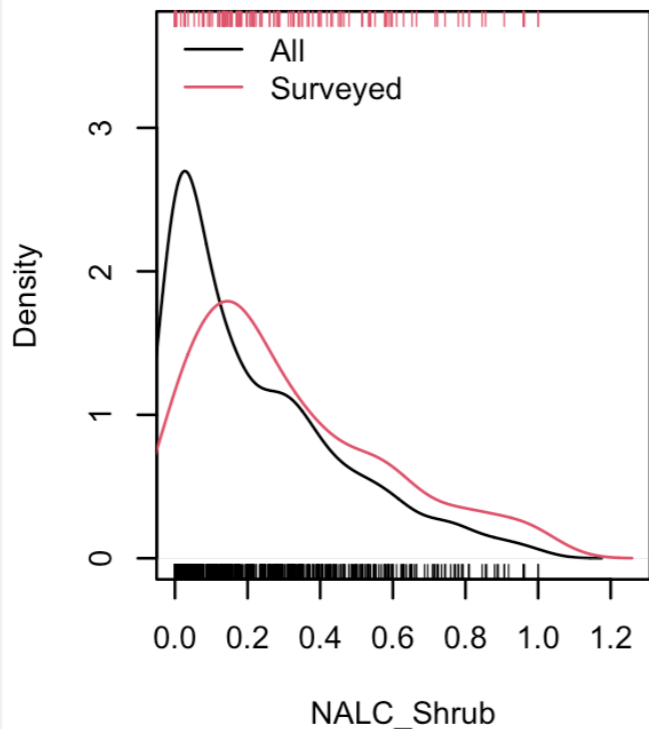
Univariate variable to explore

NALC_Shrub

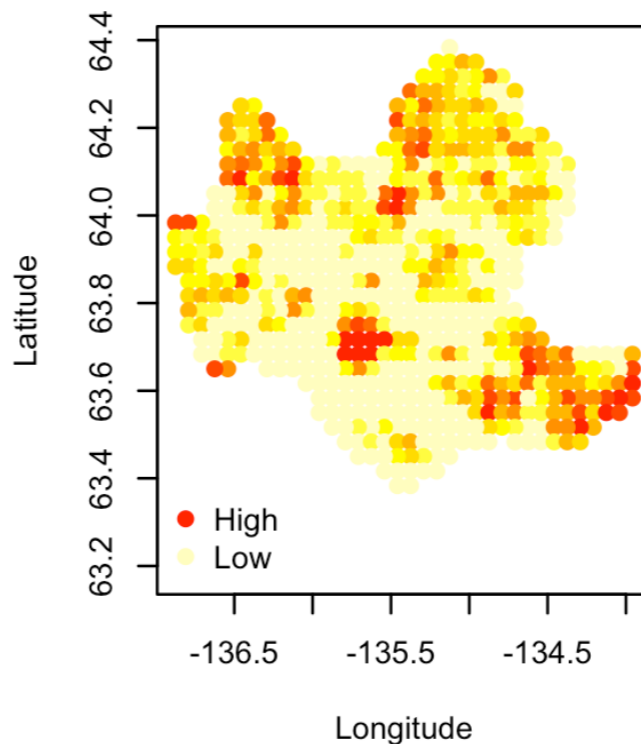
Distribution

- P
- NB
- ZIP
- ZINB

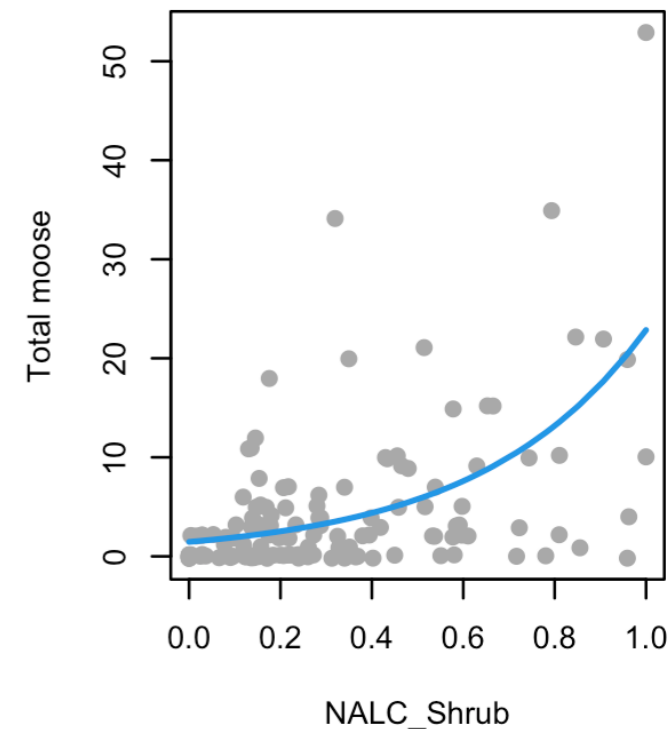
Density



Map



Total moose response



Exploring Predictions

Settings

Data

Explore

Total

Models

Residuals

Prediction Intervals

Explore Predictions

Documentation

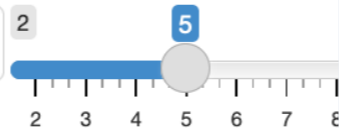
Download results as Excel file

Map

Variable to map

Cell.accuracy

Number of colour-bins



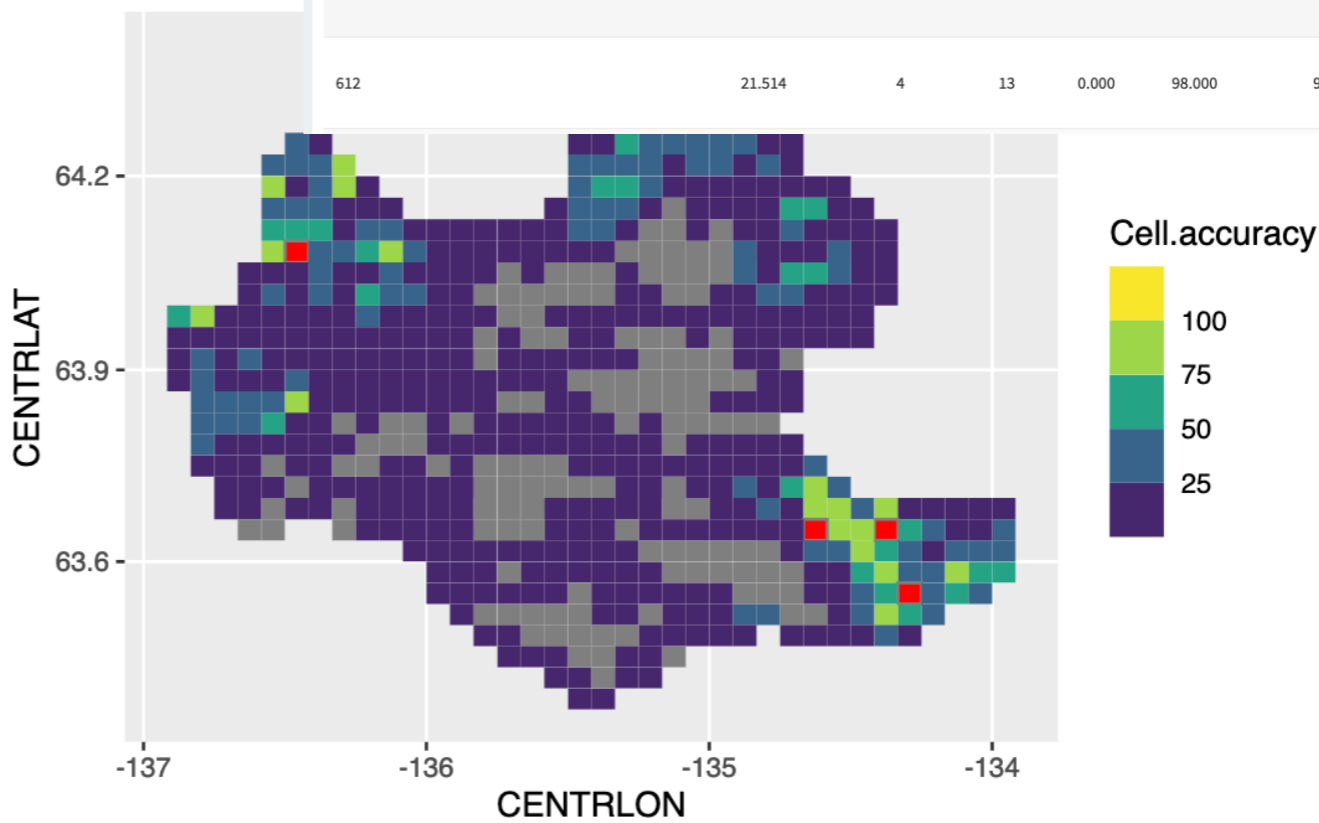
Data

Reset selection

Show 10 entries

Search:

	observed_values	fitted_values	Cell.mean	Cell.mode	Cell.pred	Cell.PIL	Cell.PIU	Cell.accuracy	Residuals	srv
594			17.394	3	10	0.000	102.000	102.000		false
434			15.51	3	9	0.000	99.020	99.020		false
622			20.416	4	11	0.000	99.010	99.010		false
597			19.61	4	11	0.000	98.505	98.505		false
438			17.31	3	10	0.000	98.030	98.030		false
612			21.514	4	13	0.000	98.000	98.000		false



Exploring Predictions

Download results as Excel file

Map

Variable to map

Cell.accuracy

Number of colour-bins



Data

Reset selection

Show 10 entries

Search:

	observed_values	fitted_values	Cell.mean	Cell.mode	Cell.pred	Cell.PIL	Cell.PIU	Cell.accuracy	Residuals	srv
594			17.394	3	10	0.000	102.000	102.000		false
434			15.51	3	9	0.000	99.020	99.020		false
622			20.416	4	11	0.000	99.010	99.010		false
597			19.61	4	11	0.000	98.505	98.505		false
438			17.31	3	10	0.000	98.030	98.030		false
612			21.514	4	13	0.000	98.000	98.000		false

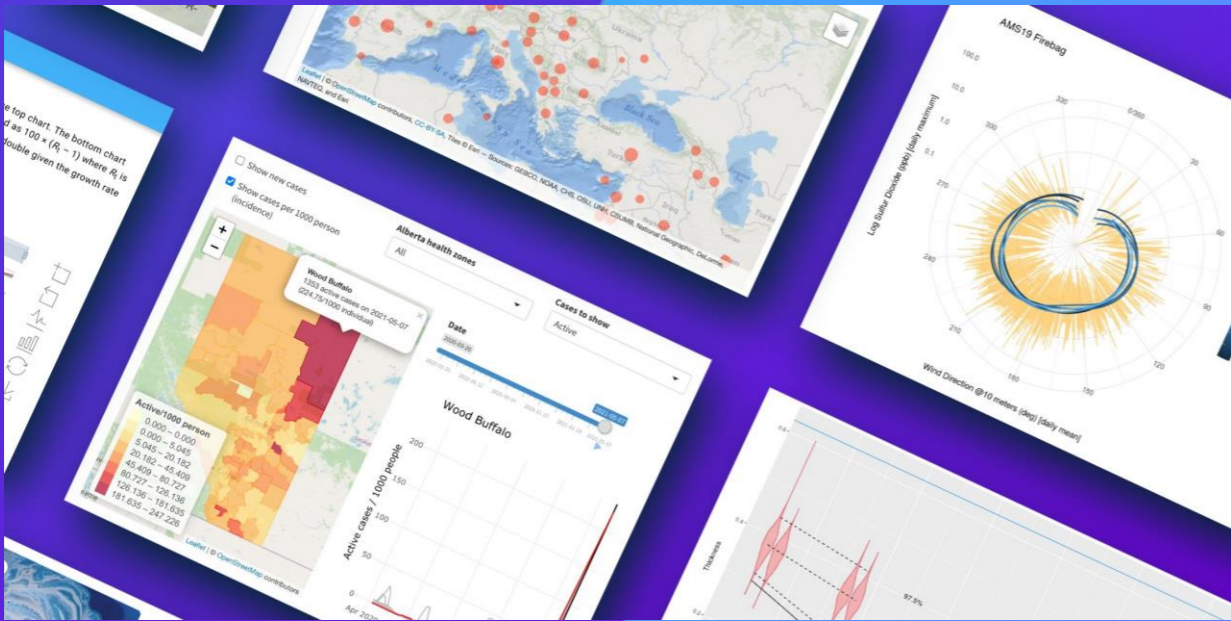
64.2 -

-137 -136 -135 -134

CENTRLON



The team is exceptional at taking complex concepts and making them accessible by creating interfaces.
– Sophie Czetwertynski / Yukon Govt.



Example #4

Cloud Database

Government of British Columbia

Cloud Database and Computing Training

01

Needs assessment,
discovery

15-people team

Managing their own databases

200M records on desktop

Need to demonstrate ROI



Cloud Database and Computing Training

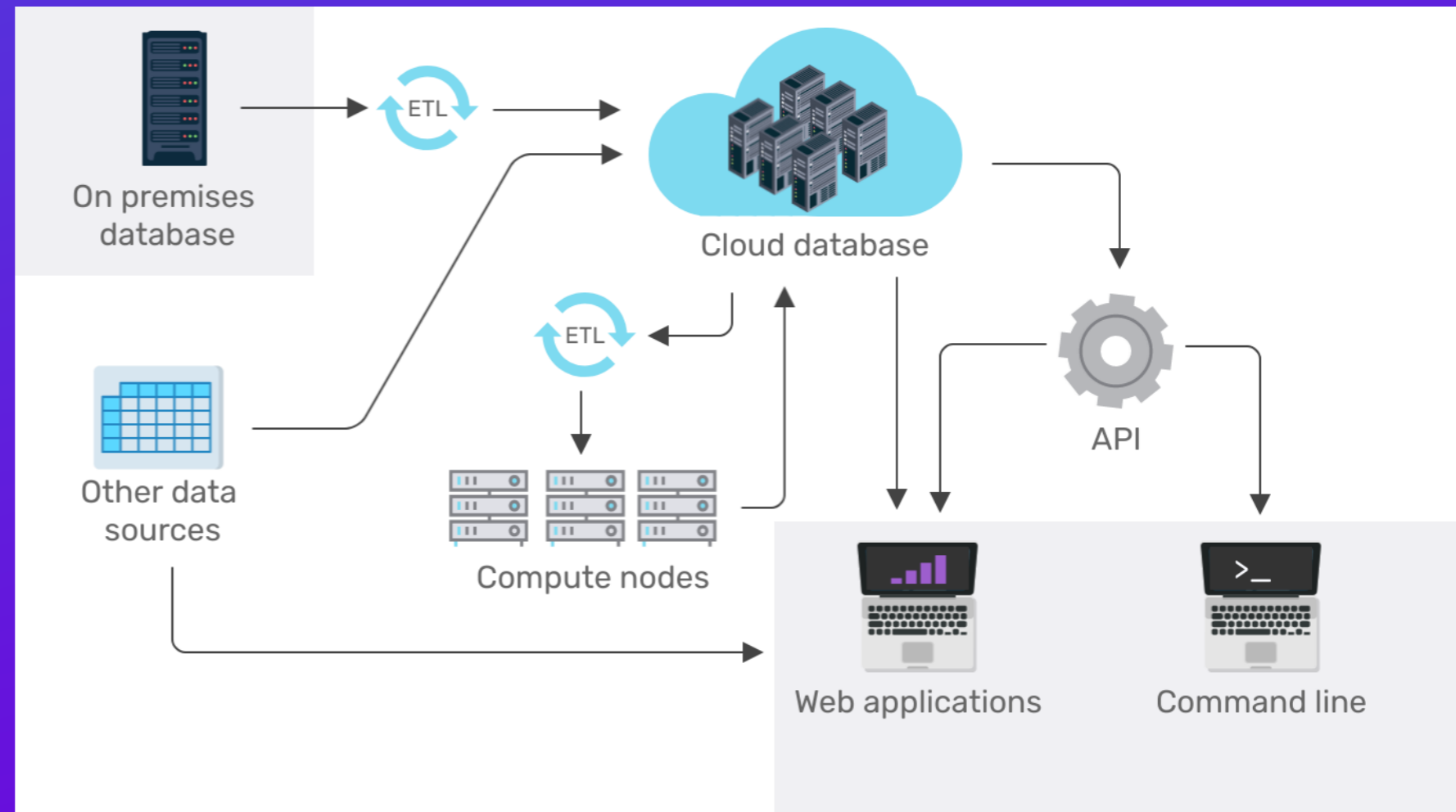
02

PoC cloud infra,
cost-benefit analysis

<\$1000/mo

Centralized
team control
panel

Ungoing
support



Cloud Database and Computing Training

03

Climate Change Informed Species Selection Tool

What should we stock so that it survives?

200M points

Cloud database with centralized access

BRITISH COLUMBIA CCISS BEC MAP FEASIBILITY SILVICULTURE BGC FUTURES EXPORT ABOUT

Points of Interest

Upload +Add Delete Clear

Show 5 entries

ID	Site	Lat	Long	Elev	BGC
1	3498370	52.71637	-124.35425	1494	MSxv
2	2601384	53.24661	-125.87219	1004	SBPsmc
3	2768684	54.01533	-125.57556	717	SBSdk
4	3935908	53.56426	-123.58704	955	SBSdw2
5	4224052	51.89119	-123.20801	1011	IDFxm

Showing 1 to 5 of 6 entries

Previous 1 2 Next

RCP Scenario: 4.5 W/m2 8.5 W/m2

Multiple Point Aggregation: Individual Averaged by BGC Zone

Generate results

Instructions:
Click on the map or use table to add points.
To edit cells, double click a row.
Hit Ctrl+Enter to submit new values.

Zone : MS
Subzone : xv
Variant : NA
Phase : NA
Natural Disturbance : NDT3
Map Label : MSxv
Bgc Label : MS xv
Zone Name : Moist Spruce
Subzone Name : Very Dry Very Cold
Variant Name :
Phase Name :
Natural Disturbance Name : Ecosystems with frequent stand-replacing events
Feature Area Sqm : 6307220813.0961
Feature Length m : 1280342.5162
Elevation m : 1494
Site No : 3498370
Forest Region : Cariboo

Cloud Database and

03

Climate Change Informed Species



Thank you for introducing us to cloud computing ... helped us find a system that meets our needs.
– Dr. Tyler Muhly / Govt. of British Columbia

What
sto
survives!

200M points

Cloud database
with centralized
access

3	2768684	54.01533	-125.57556	717	SBSdk
4	3935908	53.56426	-123.58704	955	SBSdw2
5	4224052	51.89119	-123.20801	1011	IDFxm

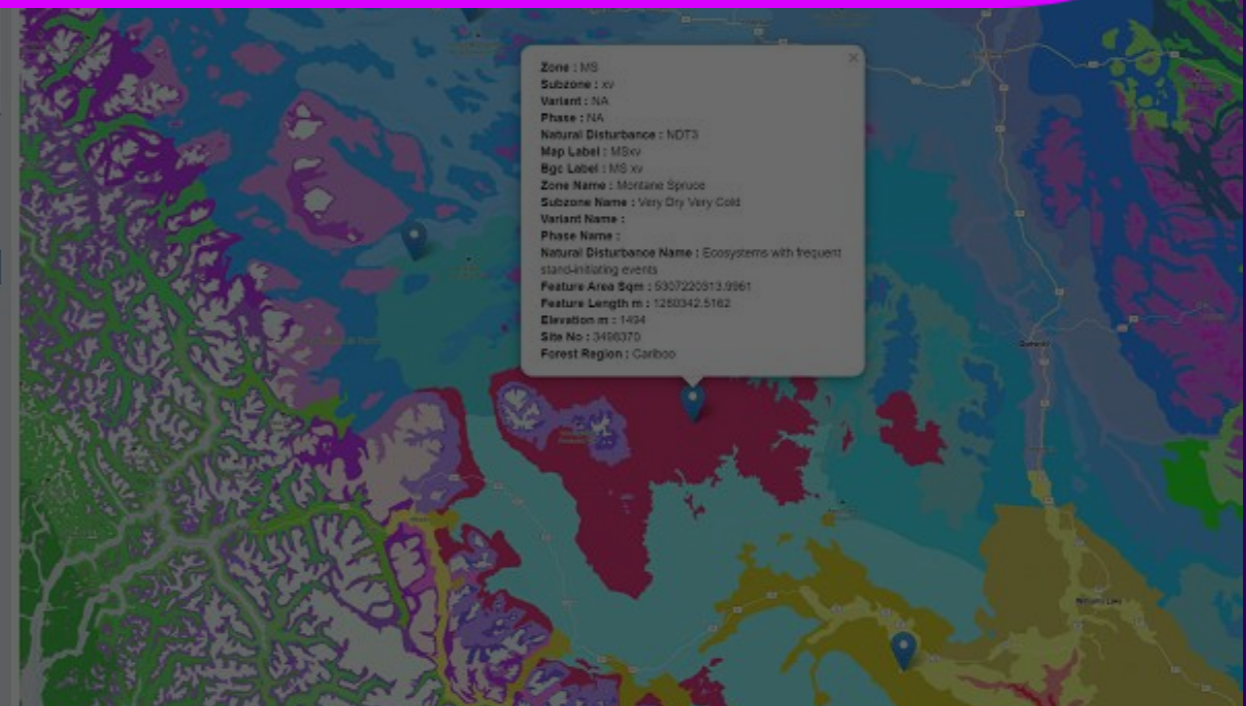
Showing 1 to 5 of 6 entries

Previous 1 2 Next

RCP Scenario: 4.5 Wm2 8.5 Wm2

Multiple Point Aggregation: Individual Averaged by BGC Zone

Instructions:
Click on the map or use table to add points.
To edit cells, double click a row.
Hit Ctrl+Enter to submit new values.





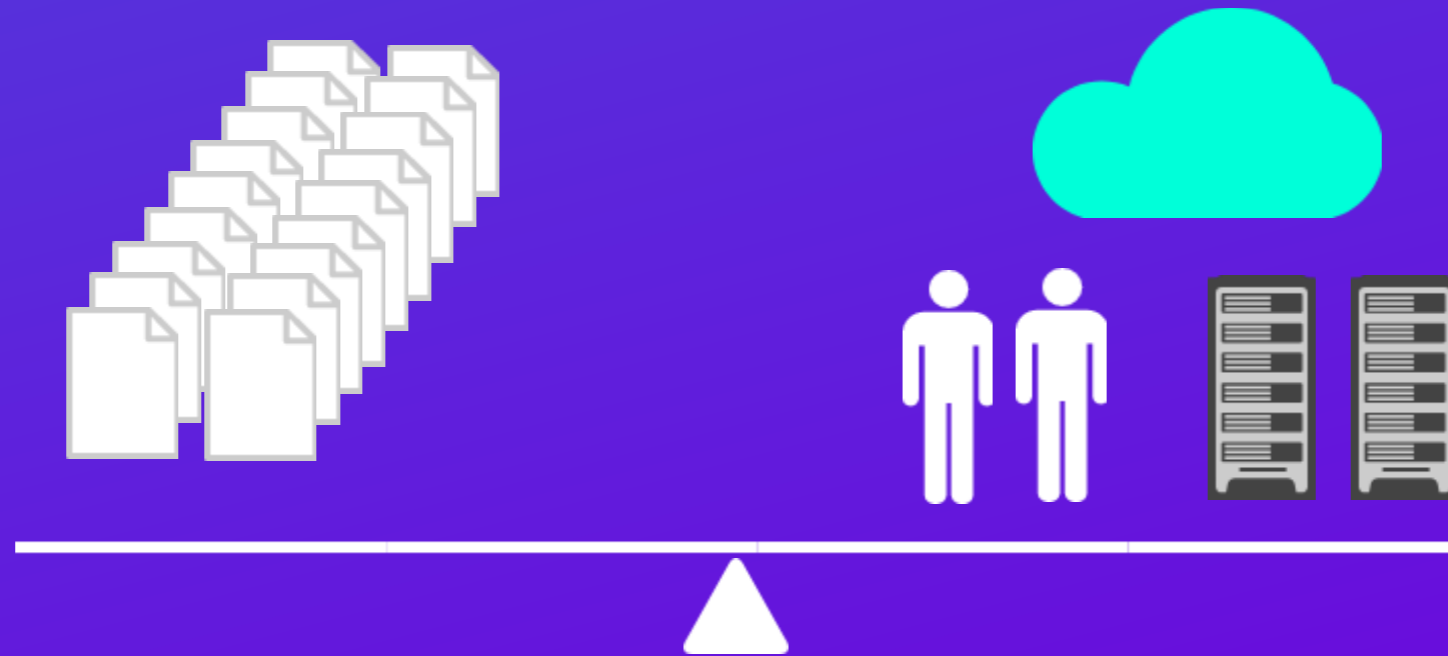
*Thank you for introducing us to cloud computing ...
helped us find a system that meets our needs.
– Dr. Tyler Muhly / Govt. of British Columbia*

Shiny Contest Grand Prize Winner



*Not only is the reactive functionality in the app
is smooth, it's also robust to errors with gentle
fail mechanisms vs. crashing the app!*

Tip The Scale to Your Advantage!



Thank You!



analythium.io

hello@analythium.io