

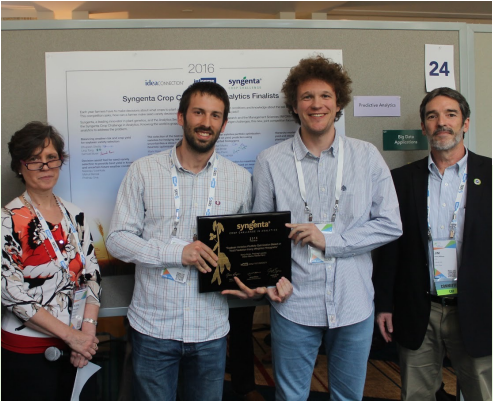


CROPT

AI solutions for agriculture of the future

Timeline

2016



Syngenta Crop Challenge
4th place

2018

BioSense Institute Novi Sad wins contest in Kenya – Smart choice of seed solving hunger problem in Africa



Bill and Melinda Gates
Foundation grant

2021



2019



Syngenta Crop Challenge
1st prize



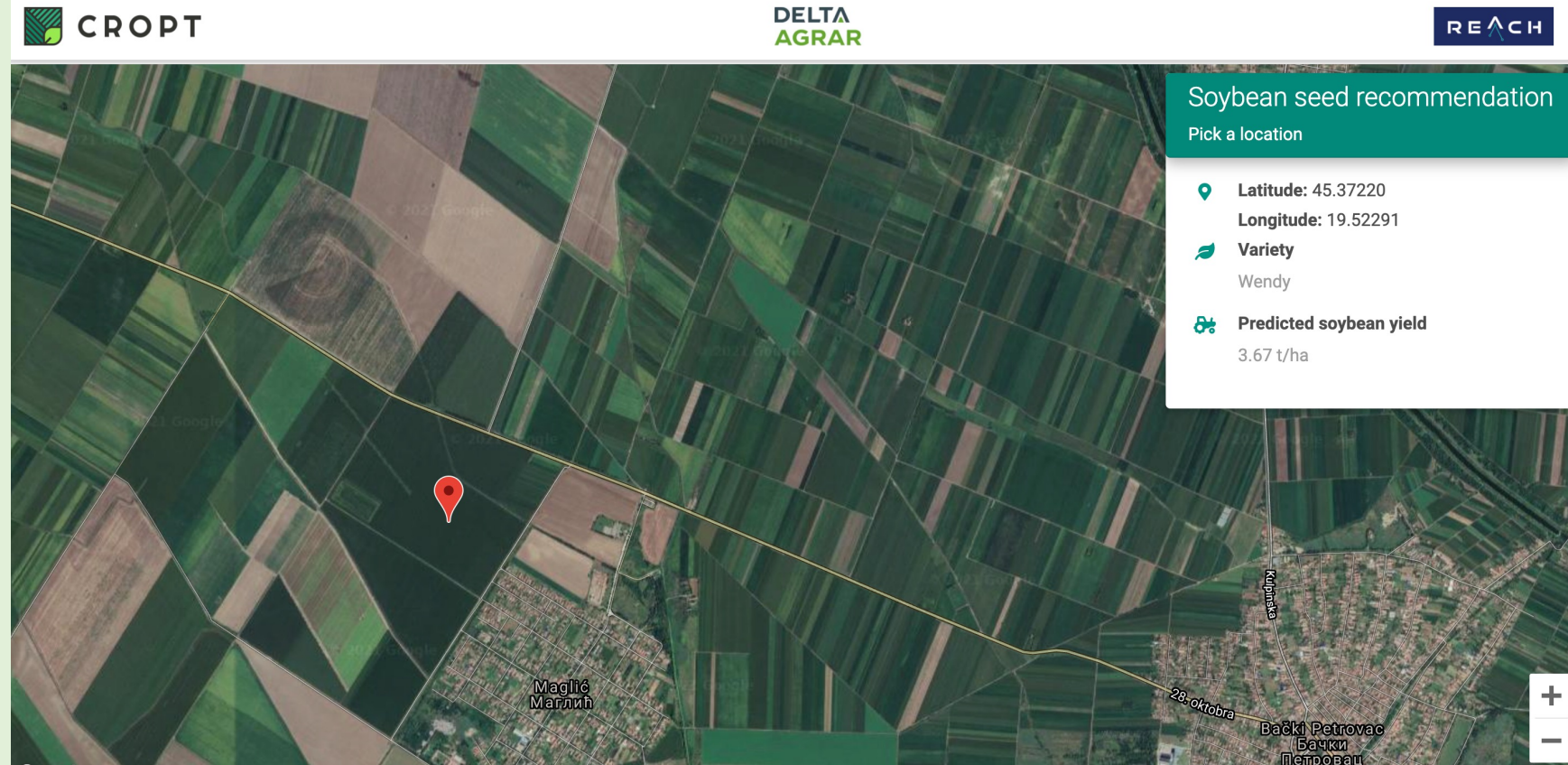
Company officially founded through
Serbian Innovation Fund grant

Smart Seed Recommendation

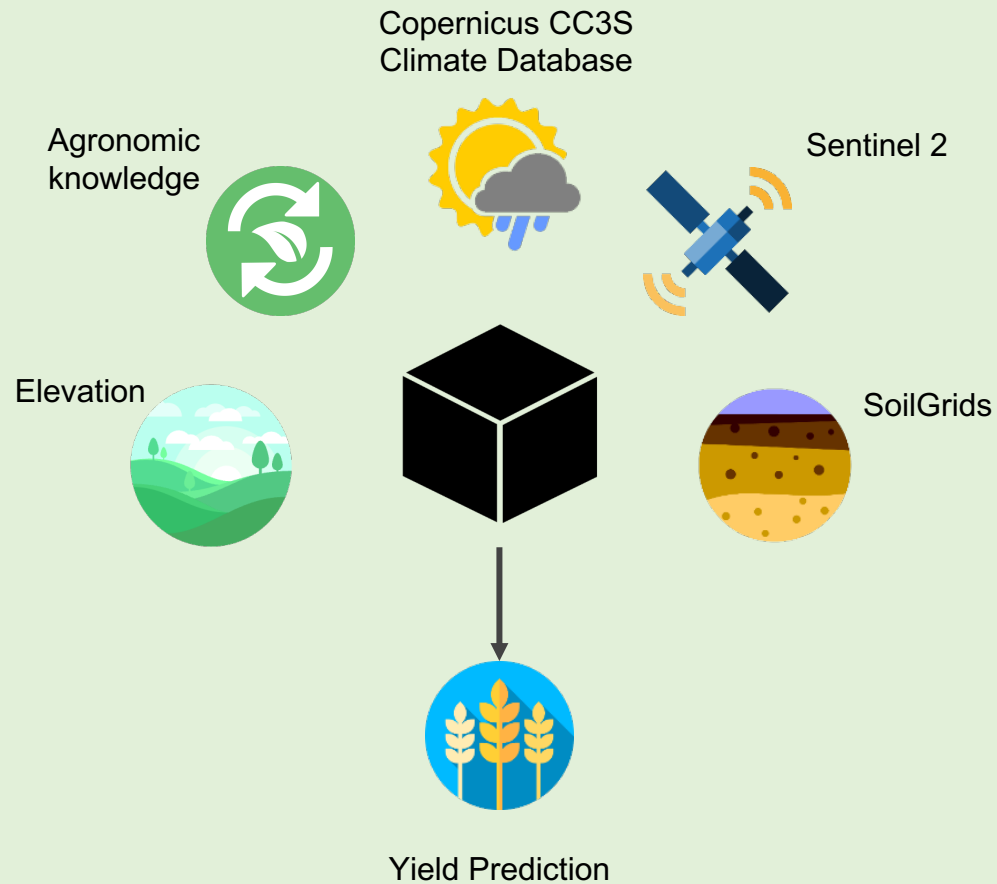
- Recommendation based on the local conditions
- Smart distribution of seeds

CUSTOMISED
SEED
RECOMMENDATION

ADDED
VALUE
FOR FARMERS

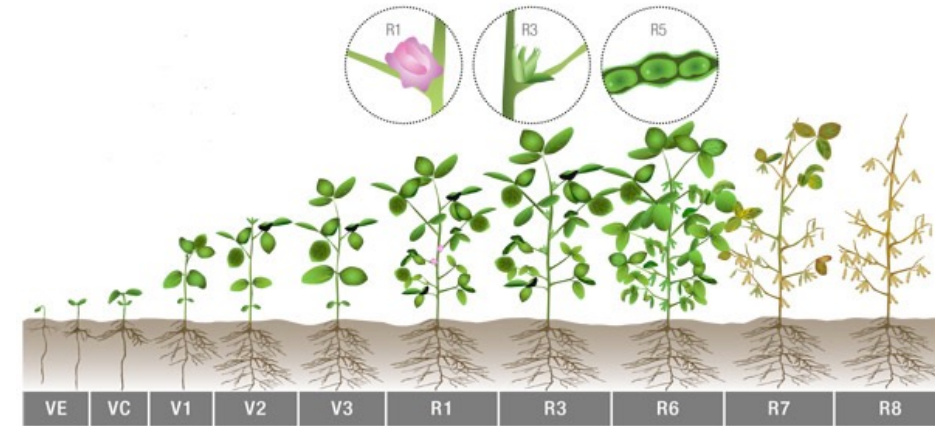


Big Data Analytics

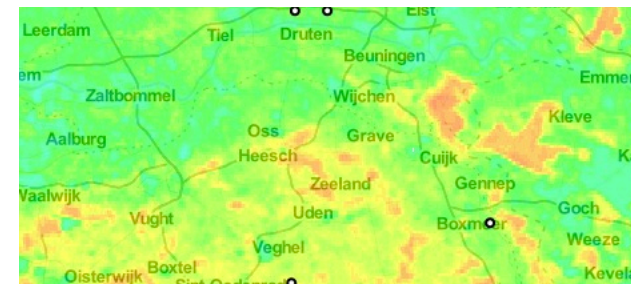


Feature Engineering

- Climate data at 1h resolution (1979-)
Feature engineering based on domain knowledge



- ISRIC SoilGrids maps 250m
~200 parameters (7 depths) -> PCA, LDA, autoencoders



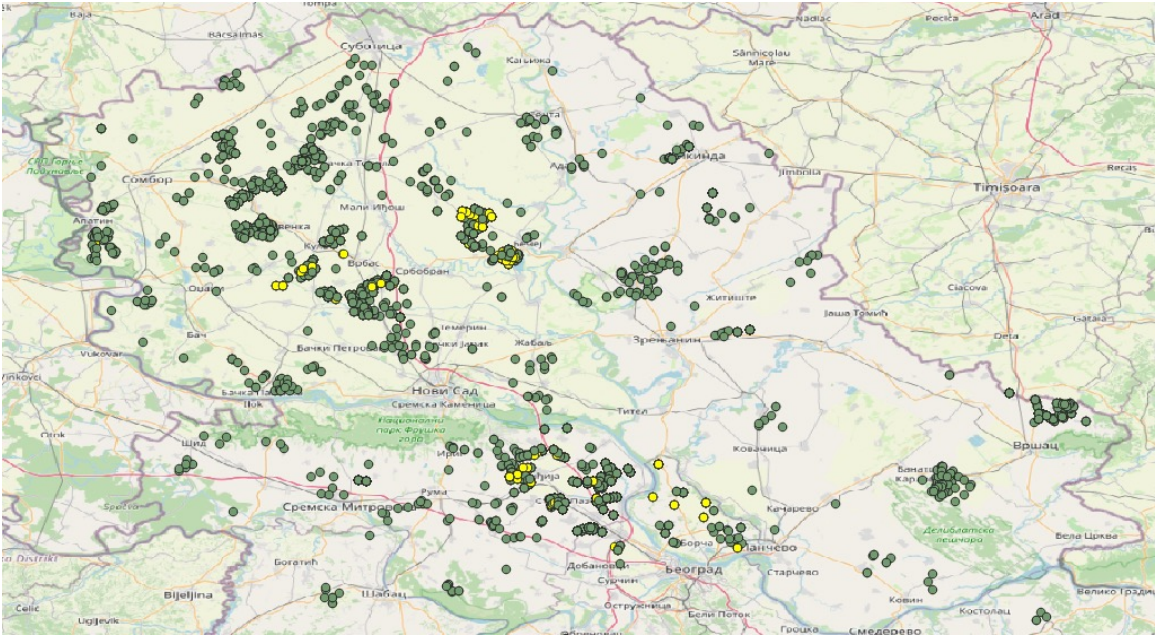
Delta's Database



Parcel information [ha]				Growing				
Parcel	Area	Latitude	Longitude	Year	Crop	ed producti	Variety	eed catego
G-1-1	63.2	45.84584	19.50491	2020	Oilseed rap	0	Imperial	
G-1-2	22.48	45.84594	19.50482	2020	Oilseed rap	0	Imperial	
G-2-1	94.3	45.85271	19.51383	2020	Soybean	0	Dukat	C1
G-2-2	20.59	45.8518	19.514	2020	Soybean	0	Dukat	C1
G-3-1	63.28	45.84486	19.52034	2020	Barley	0	Salamandre	
G-3-2	17.8	45.84422	19.52051	2020	Barley	0	Salamandre	

Output [t/ha, RSD/kg, RSD/ha]			Time frame	
Yield	Price	Revenue	Planting date	Harvest date
3.6	39.98	143.928	17.9.19 00:00	2.7.20 00:00
3.4	39.98	135.932	17.9.19 00:00	2.7.20 00:00
4.093889	37.78	154.6671	9.4.20 00:00	14.9.20 00:00
3.472559	37.78	131.1933	9.4.20 00:00	14.9.20 00:00
9.339117	17.19	160.5394	7.10.19 00:00	25.6.20 00:00
6.848315	17.19	117.7225	7.10.19 00:00	25.6.20 00:00
4.373026	37.78	165.2129	9.4.20 00:00	14.9.20 00:00
3.666532	37.78	138.5216	9.4.20 00:00	14.9.20 00:00

	Raw material [kg/ha]							Machinery and labour costs per ha [RSD]					
Previous cro	Seed units	Manure	tiliser amo	N	P	K	sticide amo	Tillage	Sowing	liser applica	icide applic	Irrigation	Harvest
Soybean	9	0	891	142.1205	117.16	113.4869	4.794304	4820.75	3031.25	7666	15084	3000	11232
Soybean	3	0	821.1744	137.6335	104.0925	93.41637	4.848754	4820.75	3031.25	7666	15084	3000	11232
Maize	7100	0	339.3425	60.4779	57.09452	28.54726	3.654944	26277	3084.15	3196	11953	3000	10510.92
Maize	1900	0	320.544	58.08645	53.61826	26.80913	3.287282	26277	3084.15	3196	8860.176	3000	10510.92
Soybean	13000	0	308.1542	58.20189	86.11987	0	7.054362	18501.6	3712.97	4614	18083	3000	12476
Soybean	3695	0	396.6292	69.50562	130.2921	0	7.595506	10438	3712.97	4614	18083	3000	12476

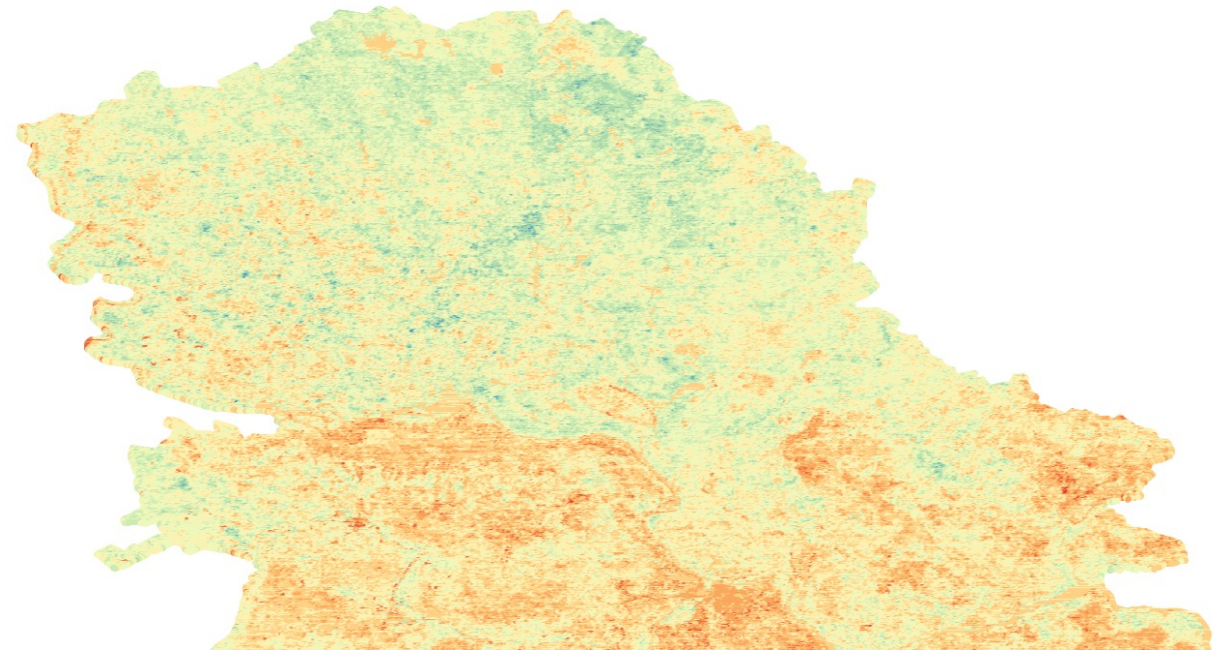


Yield Prediction

- Machine Learning models
Conventional: Random Forest, SVM, k-NN, XGBoost
Deep Neural Networks
- 1st approach: Model \sim variety
2nd approach: variety categorical feature
- Categorical encoding:
One-hot
Numbering
Embeddings
- ML models handling categorical data:
catBoost
histGradientBoosting
tree-based models (RF)



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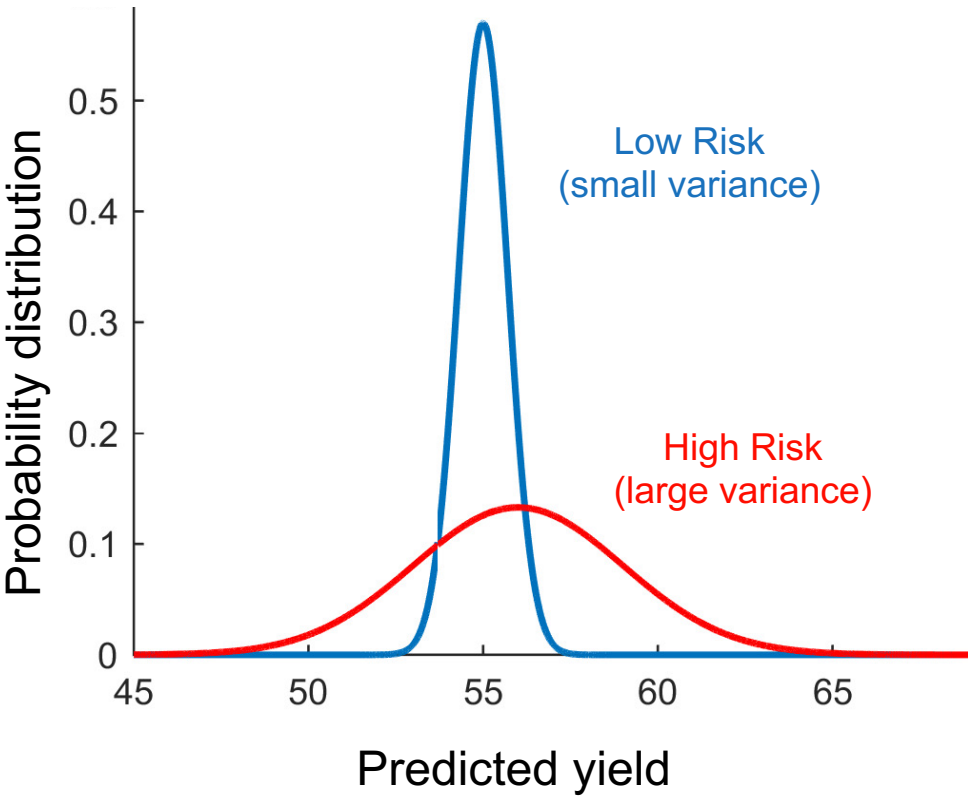
Yield Maps

- Big Data analytics
High resolution
PySpark
Parallelisation
Cythonisation

Risk Assessment

- Predicting the yield in different weather scenarios
- Risk assessment
- Customised loans & interest rates

Weather Scenarios	Yield
1	High
2	Medium
3	High
...	
15	Low



Software Architecture

Prototype available at selsem.cropt.ag



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