

KAUST Hackathon in Geoscience

Project: Energy Harvest

Team : GeoHub

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Content

- Project description and objective
- Method and procedure
- Results and codes
- Conclusion

Project description and objective



جامعة الملك عبد الله
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Science and Technology

- **Static Parameters**

- Permeability x, y
- Permeability anisotropic ratio
- Reservoir Thickness
- Porosity
- Constant BHP
- Constant water injection rate

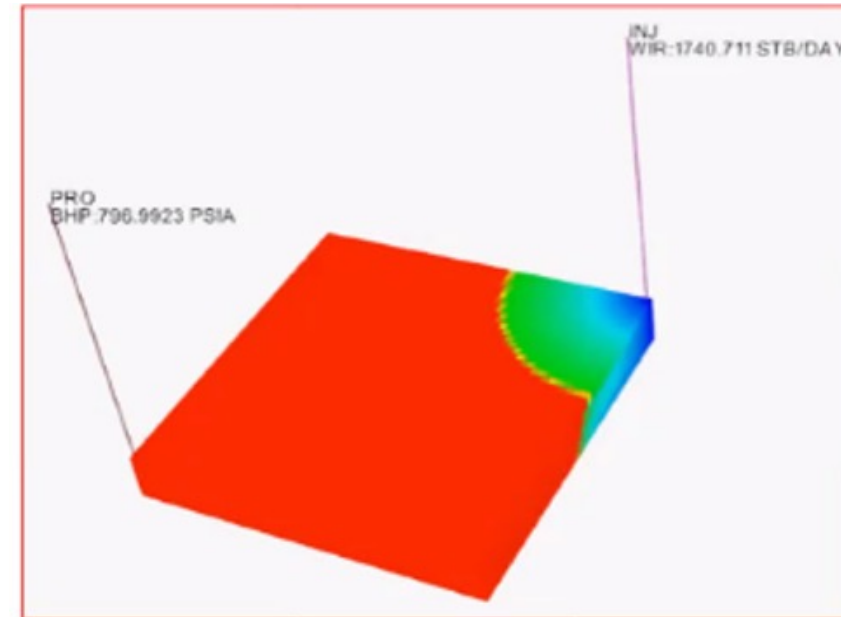
- **Data**

- 1000 simulation runs, 121 timestep each, total of 121000 data point

- **Objective:**

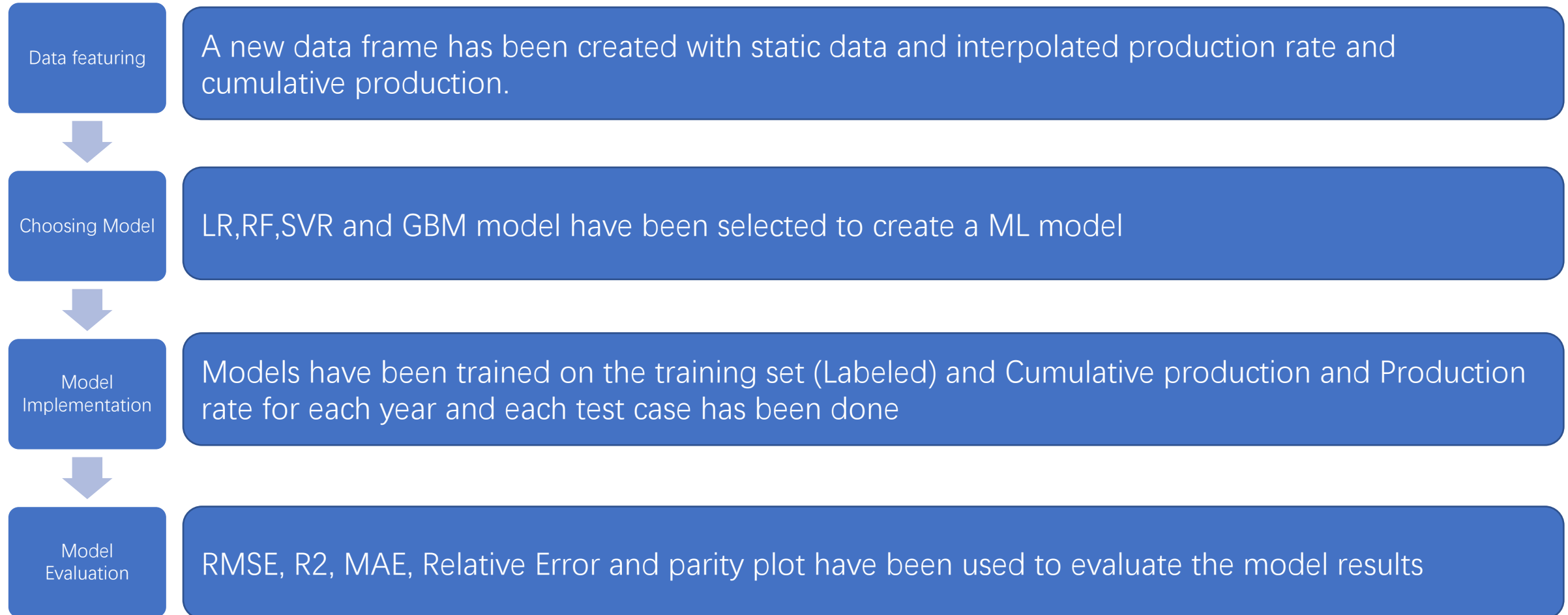
Develop ML model to predict:

1. Cumulative oil production at 10 year
2. Oil production rate time series in 10 years





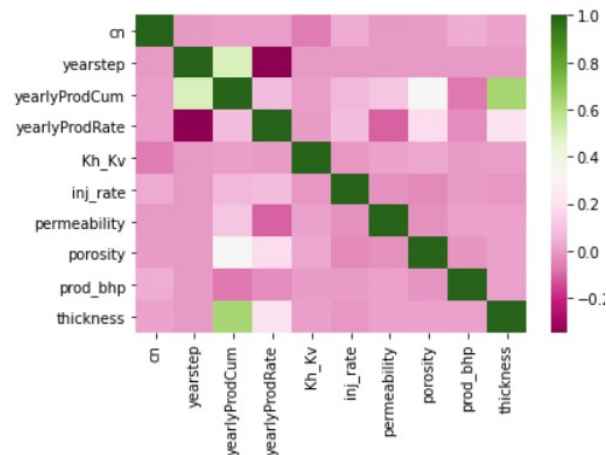
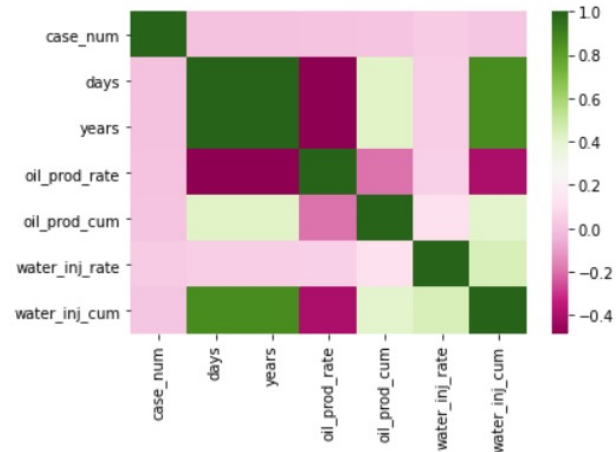
Method and Procedure



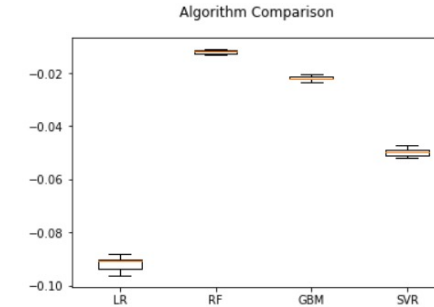
Method and Procedure



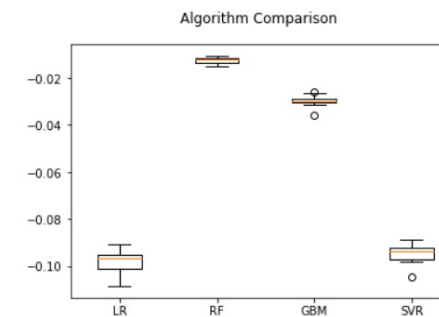
Data
Featuring



Choosing
Model

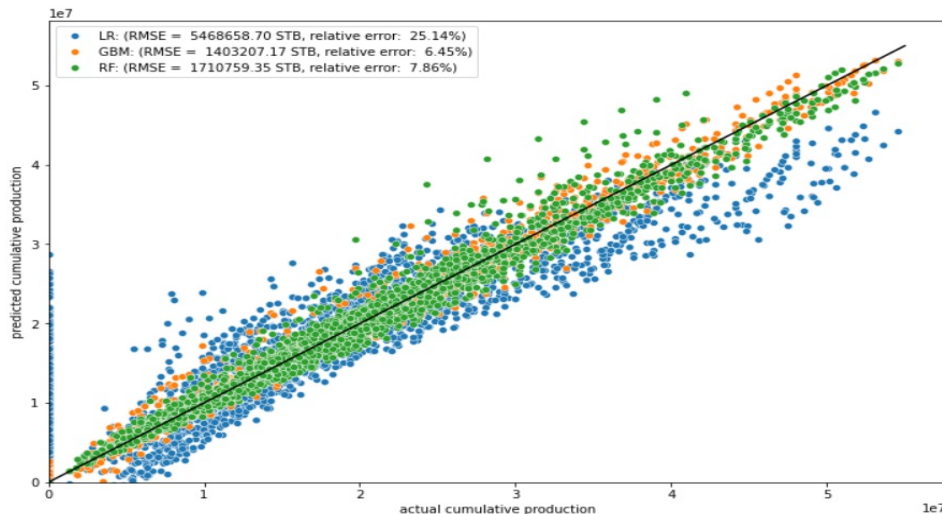
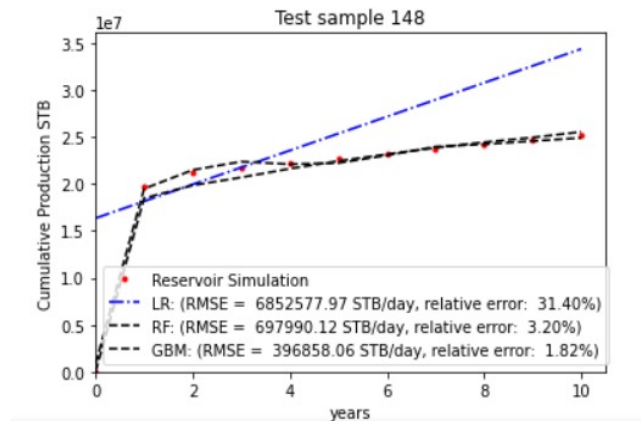
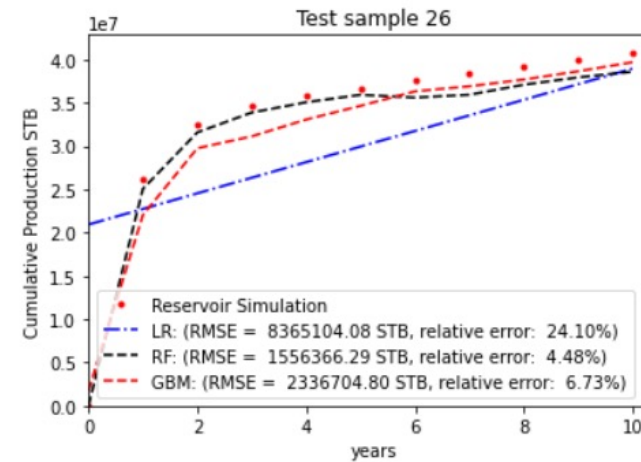
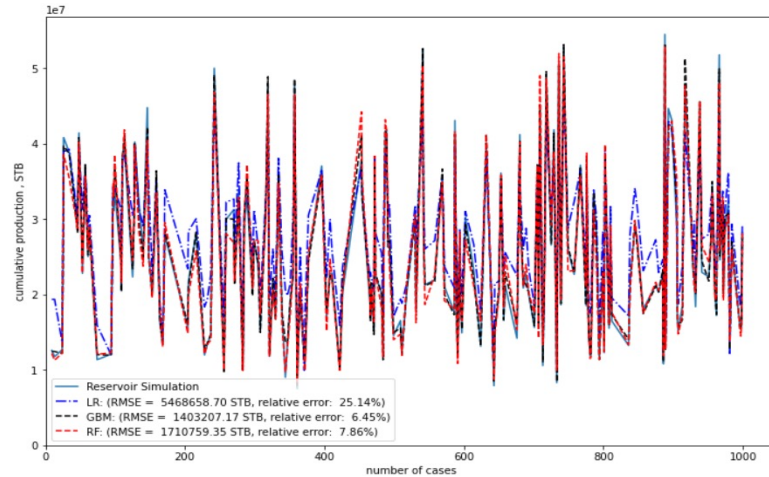


Model	Cross validation score	STD
LR:	-0.091749	-0.002345
RF:	-0.011976	-0.000686
GBM:	-0.022015	-0.00096
SVR:	-0.049804	-0.001457



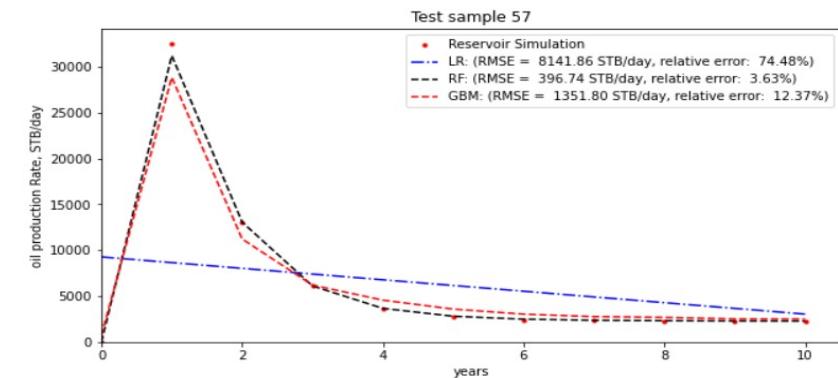
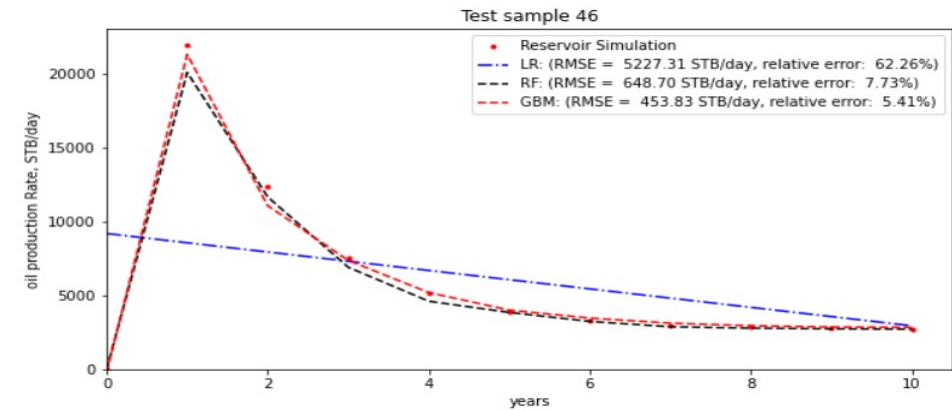
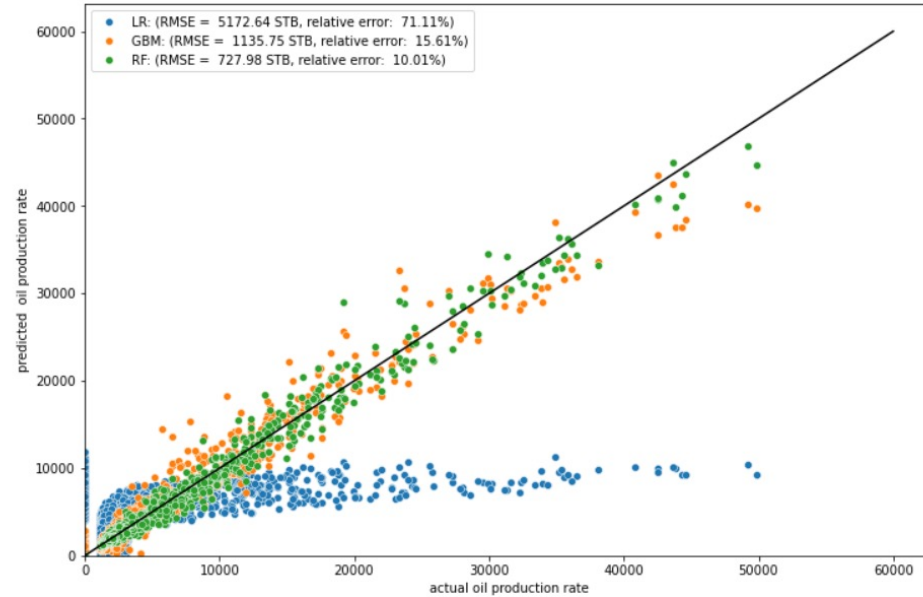
Model	Cross validation score	STD
LR:	-0.091749	-0.002345
RF:	-0.012058	-0.000797
GBM:	-0.022015	-0.00096
SVR:	-0.049804	-0.001457

Results- Objective 1



	RMSE	Relative error	R2	MAE
RF	1710759.4	7.864	0.979	1116620.3
GBM	1403207.2	6.45	0.986	940879.13
LR	5468658.7	25.138	0.783	3855117.6

Results- Objective 2



	RMSE	Relative error	R2	MAE
RF	727.985	10.008	0.985	322.723
GBM	1135.752	15.614	0.963	613.954
LR	5172.642	71.112	0.224	2962.578

Results and Codes

Codes

Conclusion

- Machine-learning-based surrogate models have been proposed to predict the oil production in a water-flooding reservoir.
- The results showed that the GBM obtained the best performance for the first objective compared to other ML models, and RF gave the best results for the second objective.

Thank You for your attention