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FIKI HIDAYAT <fikihidayat@eng.uir.ac.id>

Submission Confirmation

"Alexandria Engineering Journal" <em@editorialmanager.com>   Wed, Apr 14, 2021 at 2:23 PM
Reply-To: "Alexandria Engineering Journal" <info-aej@alexu.edu.eg>
To: Fiki Hidayat <fikihidayat@eng.uir.ac.id>

Dear Mr Fiki Hidayat,

We have received your article "Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir." for consideration for publication in Alexandria Engineering Journal.

Your manuscript will be given a reference number once an editor has been assigned.

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Kind regards,

Editorial Manager
Alexandria Engineering Journal

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FIKI HIDAYAT <fikihidayat@eng.uir.ac.id>

A manuscript number has been assigned: AEJ-D-21-01345

"Alexandria Engineering Journal" <em@editorialmanager.com>   Wed, Apr 14, 2021 at 2:41 PM
Reply-To: "Alexandria Engineering Journal" <info-aej@alexu.edu.eg>
To: Fiki Hidayat <fikihidayat@eng.uir.ac.id>

Ms. Ref. No.: AEJ-D-21-01345
Title: Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir.
Alexandria Engineering Journal

Dear Mr Fiki Hidayat,

Your submission "Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir." has been assigned manuscript number AEJ-D-21-01345.

To track the status of your paper, please do the following:

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Kind regards,

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Your Submission

"Alexandria Engineering Journal" <em@editorialmanager.com>   Tue, Jun 15, 2021 at 8:29 PM
Reply-To: "Alexandria Engineering Journal" <support@elsevier.com>
To: Fiki Hidayat <fikihidayat@eng.uir.ac.id>

Ms. Ref. No.: AEJ-D-21-01345
Title: Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir.
Alexandria Engineering Journal

Dear Mr Fiki Hidayat,

The reviewers have commented on your above paper. They indicated that it is not acceptable for publication in its present form.

However, if you feel that you can suitably address the reviewers' comments (included below), I invite you to revise and resubmit your manuscript within two months; if no action is taken, the submission link should be expired on the online submission system, thereafter.

Please carefully address the issues raised in the comments.

If you are submitting a revised manuscript, please also:

a) outline each change made (point by point) as raised in the reviewer comments

   AND/OR

b) provide a suitable rebuttal to each reviewer comment not addressed

To submit your revision, please do the following:

1. Go to: https://www.editorialmanager.com/aej/

2. Enter your login details

3. Click [Author Login]
This takes you to the Author Main Menu.

4. Click [Submissions Needing Revision]

I look forward to receiving your revised manuscript.

Yours sincerely,

Mahmoud Abdelaty
Co-editor-in-chief
Alexandria Engineering Journal

Reviewers' comments:

Reviewer #1: The authors of this article propose a method that eliminates the parameters that are determined as unimportant using a random forest regression approach. Although the proposed work has a useful aspect in encouraging the LSWI applications on carbonate reservoir, the following should be further considered for

publication.
1. First, the authors need to address the reason for adopting a random forest method among many ml techniques (especially among ensemble learning methods).
2. If there is a comparison with other techniques, it is expected that the quality of the article would be improved.

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Alexandria Engineering Journal

Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir.
--Manuscript Draft--

Manuscript Number:	AEJ-D-21-01345R1
Article Type:	Full Length Article
Keywords:	Low salinity water injection (LSWI); Carbonate Reservoir; Sensitivity Analysis; Random Forest Algorithm
Corresponding Author:	Fiki Hidayat, M.Eng Universitas Islam Riau Pekanbaru, Riau INDONESIA
First Author:	Fiki Hidayat, M.Eng
Order of Authors:	Fiki Hidayat, M.Eng
	Tengku Mhd. Sofyan Astsauri
Abstract:	This study applied a Machine Learning Algorithm based on Random Forest Regression for eliminating the insignificant parameter and evaluating the correlation between each parameter and response parameter on the Low Salinity Water Injection (LSWI) process. 1000 experimental designs of LSWI parameters, Reservoir & Injection Temperature, Volume Injection, Formation Water Composition, and Injection Water Composition were build using Design of Experiment on CMOST from Computer Modeling Group with Recovery Factor as the response parameter. The sensitivity analysis is carried out on Random Forest Regressor based on the decrease in the mean squared error. The Random Forest Algorithm recognized Injection SO_4^{2-} Composition, Formation Water SO_4^{2-} Composition, and Injection Volume as the top three parameters. Five variations of the random state value are applied and the hyperparameters of Random Forest also optimized. Both training and test data, the R^2 score respectively are consistently over 0.9 for 5 variations of the random state used. The information about the significant operation parameter of the LSWI process has potential to encourage the LSWI implementation on Carbonate.
Response to Reviewers:	Dear reviewer and editor, we have revised our manuscript per your recommendation. Please see the detail in the response to the reviewer's file.

Title: Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir

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Response to the reviewer's comment

Reviewer #1: The authors of this article propose a method that eliminates the parameters that are determined as unimportant using a random forest regression approach. Although the proposed work has a useful aspect in encouraging the LSWI applications on carbonate reservoir, the following should be further considered for publication. 1. First, the authors need to address the reason for adopting a random forest method among many ml techniques (especially among ensemble learning methods).

Revision:

We have added it in the fourth page, first paragraph. We stated various reasons to apply random forest method compared to other machine learning methods (also with other ensemble learning method, decision tree).

Random Forest is an advanced decision tree technique that can be used for classification or regression. It is also part of the ensemble learner family (Breiman, 2001). A decision tree is an easy to use method because of its clear structure. Unfortunately, the high variance makes it unstable (Liang & Zhao, 2019). Random forest emerges to deal with this issue. Random Forest is a process of creating many different decision trees with different sets of samples at each node and averaging the score of each decision trees as its final score to get a more accurate result (Liang & Zhao, 2019). Random is robust than decision tree to outliers and in unbalanced datasets, scalable and capable for handling non-linear trends in the dataset. Also, it decreases bias and overfitting in shuffling the training data using multiples trees (Alhashem, 2020). This method has a great performance due to applying the bootstrapping technique; random forest can provide high accuracy prediction and reduce the error value, variance and prevent overfitting of the predictive model (Hegde et al., 2015; Liao et al., 2020). Unlike multivariate regression and neural network, random forest is highly interpretable. It does not require any specific data distribution and variable normalization with different range because the random forest needs not rescaled, transformed, or modified (Attanasi et al., 2020; Liang & Zhao, 2019).

2. If there is a comparison with other techniques, it is expected that the quality of the article would be improved.

Thank you for the suggestion. We also added some comparison with other machine learning technique (SVM, KNN, ANN, Multivariate Linear Regression) including ensemble method (decision tree). Please see on the Result and Discussion section, in the first and second paragraph. The result for the comparison also shown in Figure 2.

Comparison has been made with several popular machine learning algorithms such as Multivariate Linear Regression, Neural Network, Support Vector Regressor, and K-Nearest Neighbors and another ensemble method, Decision tree, alongside with Random Forest. It is intended to evaluate the performance of each algorithm in building a proxy model using the collected data. Among the algorithms used, the Random Forest has the most superior performance, as shown in Figure 2.

Figure 2 Random Forest Comparison with Other Algorithms

Random Forest outweighs other machine learning algorithms in every parameter, bar training score from KNN. However, for KNN, the overfitting does happen as the validation and test score were under 0.6. Nevertheless, this result adds more confidence to use the Random Forest Regressor in investigating the features importance or a sensitivity study of the LSWI implementation on carbonate reservoirs.

FIKI HIDAYAT <fikihidayat@eng.uir.ac.id>

Submission Confirmation for AEJ-D-21-01345R1

"Alexandria Engineering Journal" <em@editorialmanager.com>
Reply-To: "Alexandria Engineering Journal" <support@elsevier.com>
To: Fiki Hidayat <fikihidayat@eng.uir.ac.id>

Sun, Jun 20, 2021 at 11:08 PM

Ms. Ref. No.: AEJ-D-21-01345R1
Title: Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir.
Alexandria Engineering Journal

Dear Mr Fiki Hidayat,

This message is to acknowledge that we have received your revised manuscript for reconsideration for publication in Alexandria Engineering Journal.

You may check the status of your manuscript by logging into the Editorial Manager as an author at https://www.editorialmanager.com/aej/.

Thank you for submitting your work to Alexandria Engineering Journal.

Kind regards,

Editorial Manager
Alexandria Engineering Journal

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FIKI HIDAYAT <fikihidayat@eng.uir.ac.id>

Your Submission

"Alexandria Engineering Journal" <em@editorialmanager.com>   Fri, Jun 25, 2021 at 9:52 PM
Reply-To: "Alexandria Engineering Journal" <support@elsevier.com>
To: Fiki Hidayat <fikihidayat@eng.uir.ac.id>

Ms. Ref. No.: AEJ-D-21-01345R1
Title: Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir.
Alexandria Engineering Journal

Dear Mr Fiki Hidayat,

I am pleased to inform you that your paper "Applied Random Forest for Parameter Sensitivity of Low Salinity Water Injection Implementation on Carbonate Reservoir." has been accepted for publication in Alexandria Engineering Journal.

Below are comments from the editor and reviewers.

Thank you for submitting your work to Alexandria Engineering Journal.

Yours sincerely,

Mahmoud Abdelaty
Co-editor-in-chief
Alexandria Engineering Journal

Comments from the editors and reviewers:

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