中国地质大学
CHINA UNIVERSITY OF GEOSCIENCES

丝路讲坛
SILK ROAD FORUM

中国地质大学
CHINA UNIVERSITY OF GEOSCIENCES

TOPIC: Academic Paper writing and Publication process (Experience sharing)

BY: Eng. Edwin E. Nyakilla

PLACE: Nanwangshan Campus

SUPER VISOR: Professor Gu jun

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PERSONAL PROFILE

中国地质大学
CHINA UNIVERSITY OF GEOSCIENCES

Eng. Edwin E. Nyakilla

Is a Drilling engineer by professional and Ph.D. student from the School of Earth resource with a research experience in the field of Well drilling and control, Directional drilling, Cementation, Formation damage, Cement design, Cement hydration reaction, Cement-formation interaction, Factor affecting cement, and Cement problems and failures.

RESEARCH PAPERS

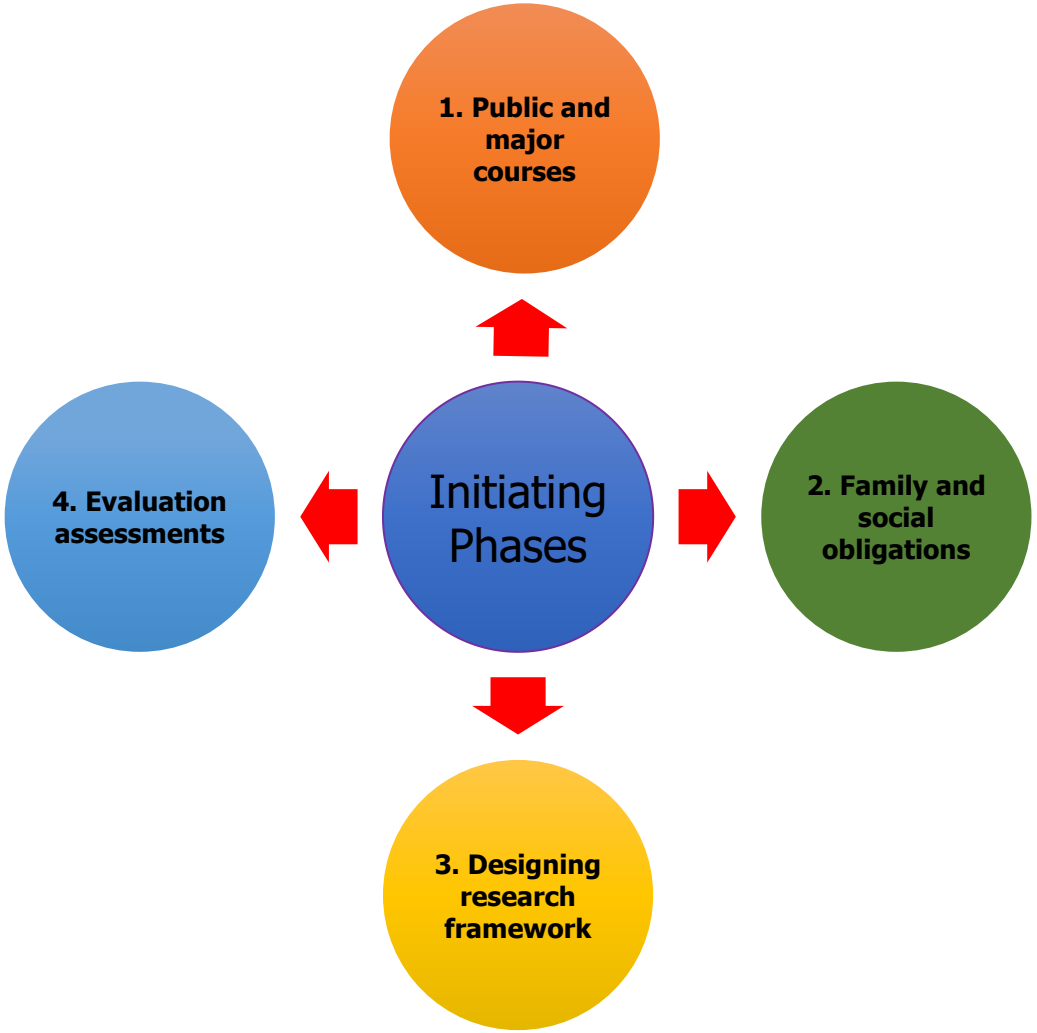
1. **Application of Machine learning in prediction of Compressive and Shear bond strength. Journal of Construction and building environment T2, Impact Factor = 6.141.**
2. **Evaluation of Source rock Potentiality and prediction of TOC using Well logs. Journal of Natural resource research T2, Impact Factor = 5.146.**
3. **Review of Development in Nanotechnology application for formation damage. Journal of Energy and Fuel T2, Impact Factor = 3.605.**
4. **C02 Sequestration and Enhanced shale gas Recovery by C02 injection Impact Factor = 3.605.**

PRESENTATION CONTENTS

1. INITIAL STAGE OF WRITING
2. CHALLENGES IN WRITING RESEARCH PAPER
3. HOW TO OVERCOME THEM IN RESEARCH PAPER
4. HOW DO WE FIND AN INNOVATIVE ARTICLE TOPIC
5. HOW ARCHIEVE THE DESIRE OF PUBLICATION
6. CONCLUSION

INITIAL STAGE OF WRITING

- The first year would be considered as initiating phase and is crucial and therefore reserved for designing and framing your research (either qualitative or quantitative) and completion of prerequisite courses (major and public).



CHALLENGES IN WRITING RESEARCH PAPER

It is almost impossible to achieve your desired targets without facing reviewers and editor challenges, particularly when your field is inter-disciplinary.

Dear Mr Nyakilla,

Thank you for submitting your manuscript to "Marine and Petroleum Geology". I regret to inform you that your manuscript does not reach the required quality standard of this journal, because of the modest scientific impact, a topic better suited for other journals, and poor presentation (quality of figures and tables, language), and we must therefore reject it.

We appreciate your submitting your manuscript to this journal and for giving us the opportunity to consider your work.

Kind regards,

Qinhong Hu, PhD
Editor-in-Chief
Marine and Petroleum Geology

CHALLENGES IN WRITING RESEARCH PAPER

It is almost impossible to achieve your desired targets without facing reviewers and editor challenges, particularly when your field is inter-disciplinary.

Thank you for submitting your manuscript to International Journal of Coal Geology. Similar studies to yours exploring HC generation potential and source rock characterization is plenty. Therefore, the topic has low novelty factor. However, what was a pleasant surprise and a fresh breath of air in your work was the inclusion of some multivariate statistics. I think that aspects sets your paper apart from others. Normally, I would send your paper out for review. The reason that I cannot do it at this time until you do correction is that the statistics lacks details and proper interpretation, I therefore reject your manuscript and suggest you to send it other alternative journals.

For alternative journals that may be more suitable for your manuscript, please refer to our Journal Finder (http://journalfinder.elsevier.com).

We appreciate you submitting your manuscript to our journal.

Kind regards,
Cevat Ozgen Karacan
Editor
International Journal of Coal Geology

CHALLENGES IN WRITING RESEARCH PAPER

It is almost impossible to achieve your desired targets without facing reviewers and editor challenges, particularly when your field is inter-disciplinary.

Thank you for submitting your manuscript to International Journal of Coal Geology. However, it looks like I rejected this paper before and I am not sure why it is resubmitted as there is nothing in the cover letter to explain the reason. I am afraid we do not have time to consider same papers multiple times without an explanation. Thank you for your understanding. It may be taken more favorably by other journals.

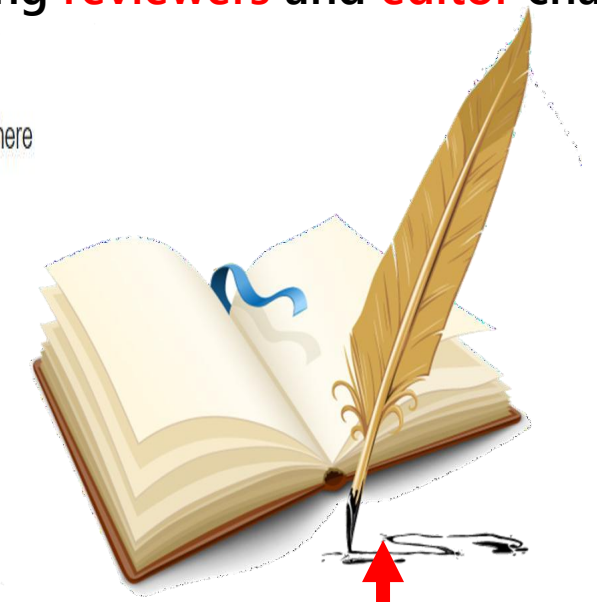
For alternative journals that may be more suitable for your manuscript, please refer to our Journal Finder (http://journalfinder.elsevier.com).

We appreciate you submitting your manuscript to International Journal of Coal Geology and thank you for giving us the opportunity to consider your work.

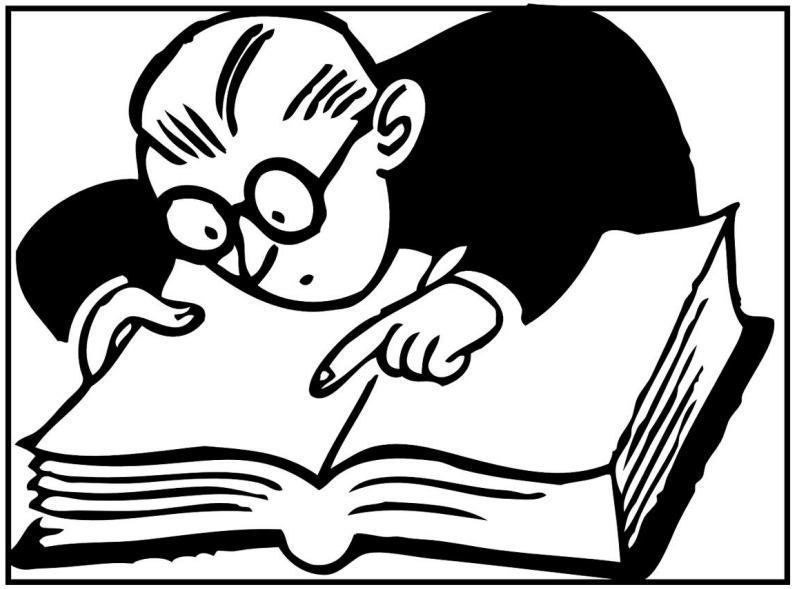
Kind regards,
Cevat Ozgen Karacan
Editor

International Journal of Coal Geology

Editor and Reviewer comments:



HOW TO OVERCOME THEM IN RESEARCH PAPER



- Re-read the comments creatively
- Do not rush to resend the paper to another journal
- Take deep breath and format your paper again
- Review your paper, language, and originality
- Identify at least 3 journal you wish to send your paper and arrange your paper accordingly
- Give your paper to the fourth eyes (someone you trust) to check and correct the language, arrangement and novelty and send it again.

HOW TO OVERCOME THEM IN RESEARCH PAPER

- **Doing research is like a movie series with unfinished episode, the more you reading, criticizing, and learning the more you improve your language, writing ability, and you get the good results.**

Reviewer #1:

Overall, this paper is writing up in the professional scientific way. The authors have a sound knowledge of theoretical science. A case study is presented to study Evaluation of source rock potentiality and TOC prediction based on integrated methods of Multivariate analysis (MVA), Machine learning, and geochemical using well logs.

HOW TO OVERCOME THEM IN RESEARCH PAPER

- **Doing research is like a movie series with unfinished episode, the more you reading, criticizing, and learning the more you improve your language, writing ability, and you get the good results.**

Reviewer #2:

The paper contains good results and are well presented, carefully discussed and a conclusion is based on strong evidences. The language of research is simple and acceptable in a general form. The authors should format the manuscript according to the journal's Instructions for authors.

HOW TO OVERCOME THEM IN RESEARCH PAPER

- **Doing research is like a movie series with unfinished episode, the more you reading, criticizing, and learning the more you improve your language, writing ability, and you get the good results.**

Reviewer#3:

The study is well-organized and written. It contains a new sight. But there is lack of discussion in dealth. Please increase discussion. And improved conclusion section. The study can be published after minor revision.

HOW TO OVERCOME THEM IN RESEARCH PAPER

- The more interact with Editors and reviewers the more you become familiar to challenges and the more you think critically on how to encounter them, improve your writing skills, and you get the get profitable result. Here is one of the results after publication ASCE.

Hello,
Thank you for your response. I have added you as a reviewer for the journal.
Many thanks for your kind assistance,
Susan O'Connor

Editorial Coordinator
American Society of Civil Engineers
editorial.coordinator@asce.kwfco.com

FINDING AN INNOVATIVE RESEARCH TOPIC

- Finding a good and innovative research topic is the most important but difficult step of flesh researchers.
- The originality and novelty of your paper determine its rejection or acceptance.

✓Original: it must demonstrates how it will contribute to new knowledge.

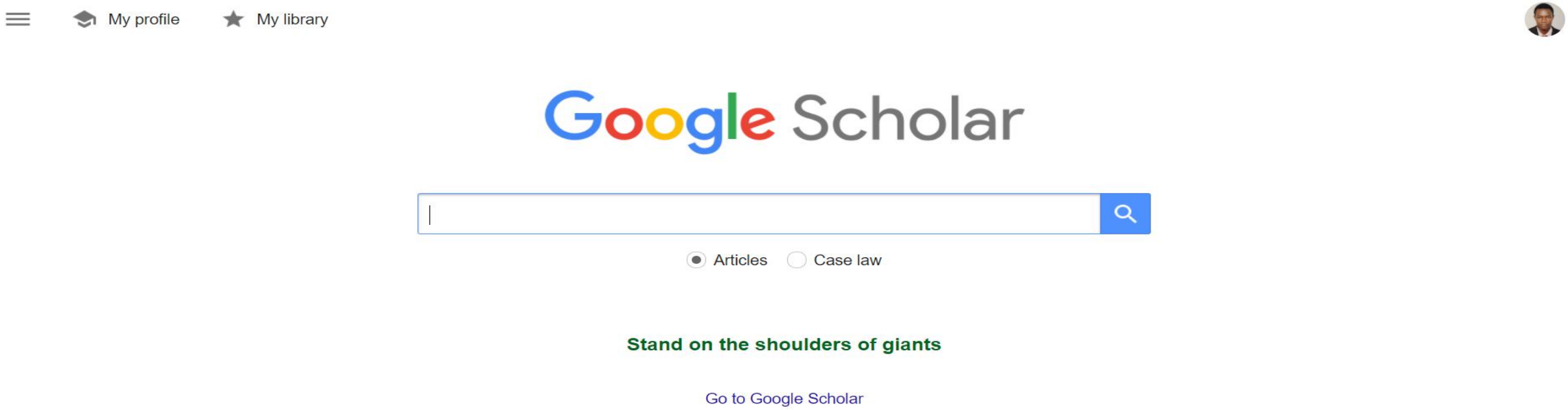
✓ Uniqueness: it must shows how it is peculiar.

✓ Clarity: It should be clearly explained.

✓ Contribution: it must show how it will extend the existing body of knowledge and show the potential implications of this new knowledge in the research area.

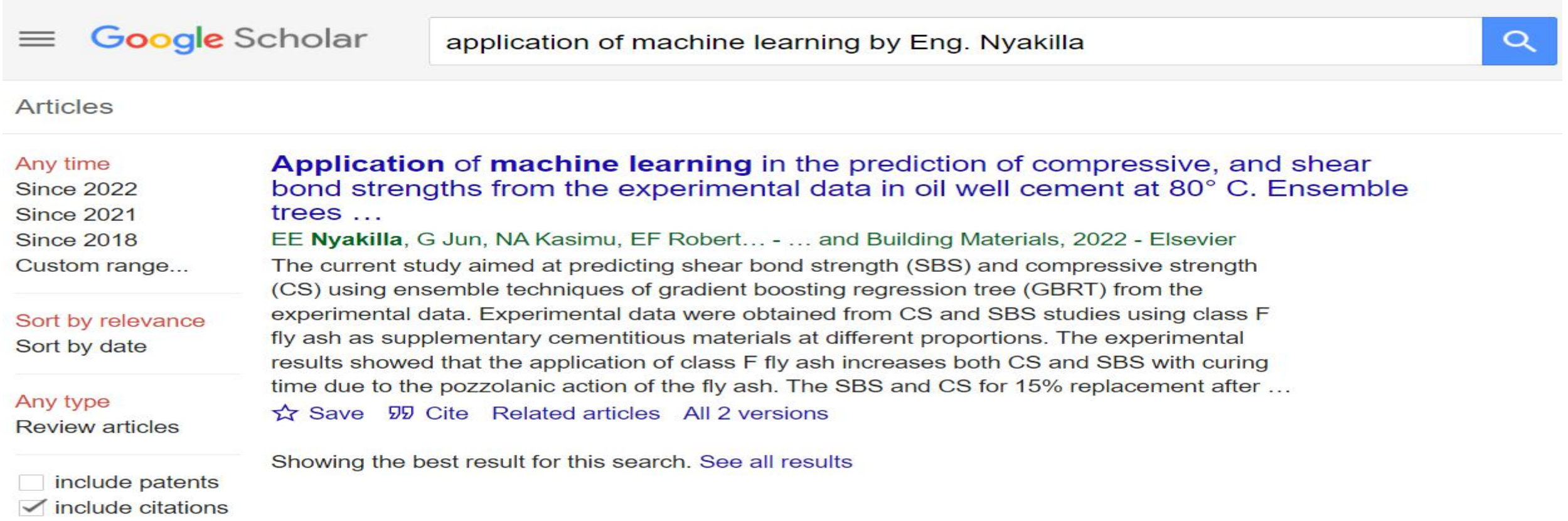
HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?

- Finding the innovative research begins with identification of appropriate research topic in your field of study and searching current literature. For example from different searching engine like google scholar, Sci-hub and others,…



HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?

- For example searching a title of one my published article; Application of ML in prediction of CS and SBS ensemble learning approach;



HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?

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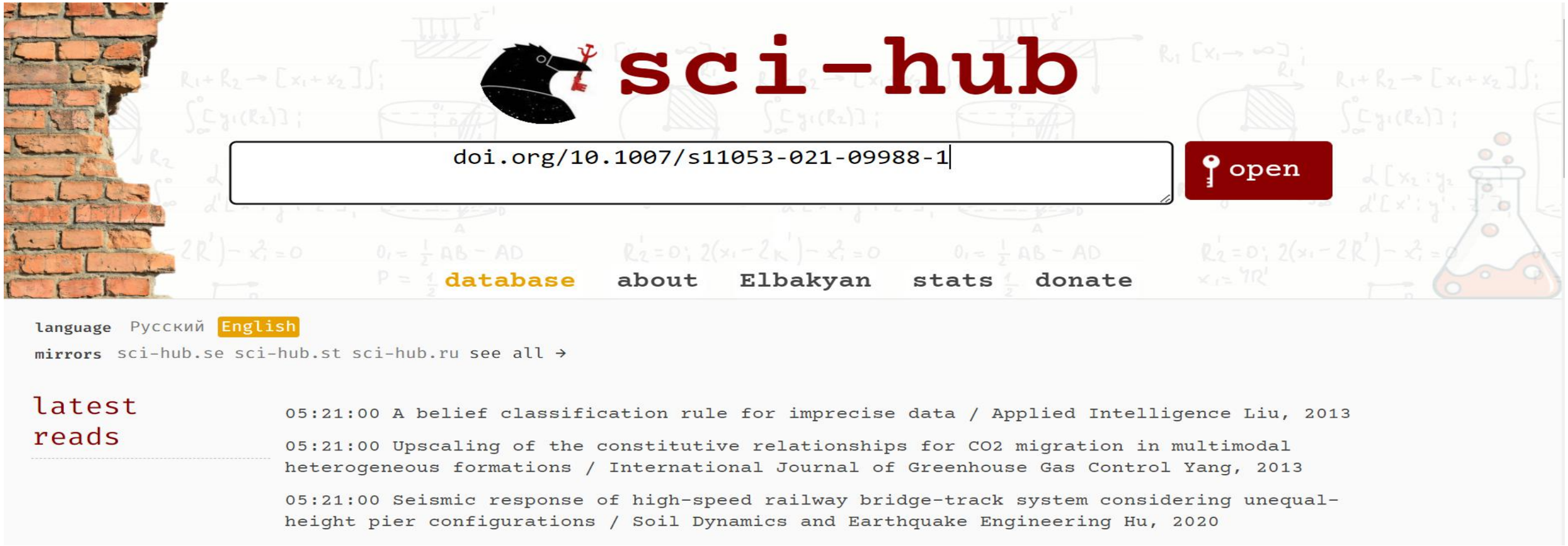
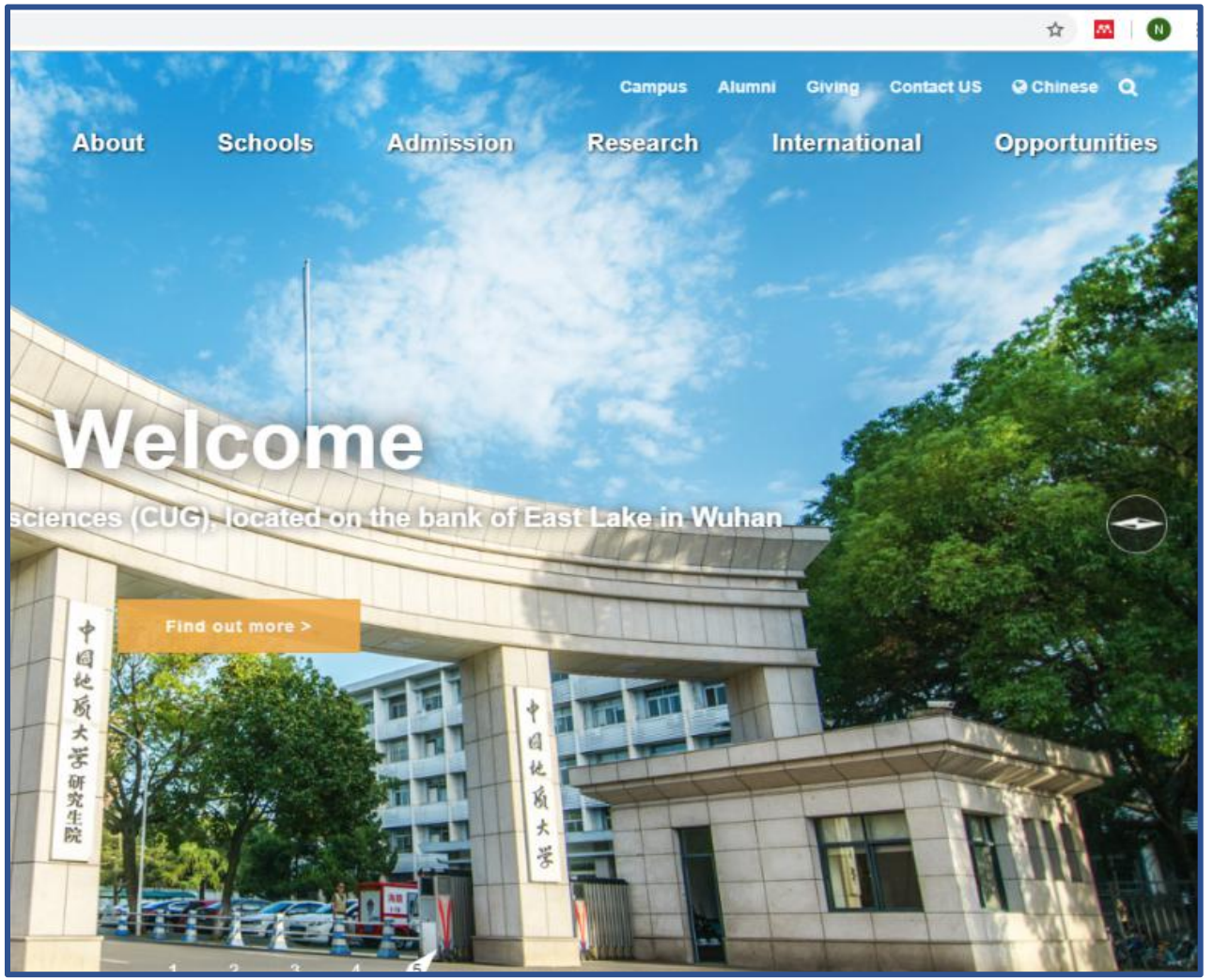


HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?

- Here in China University of Geosciences (CUG), we can acquire FREE passed paper payed by our institution through CUG library and other websites as follows; http://www.lib.cug.edu.cn/english/eresources.html



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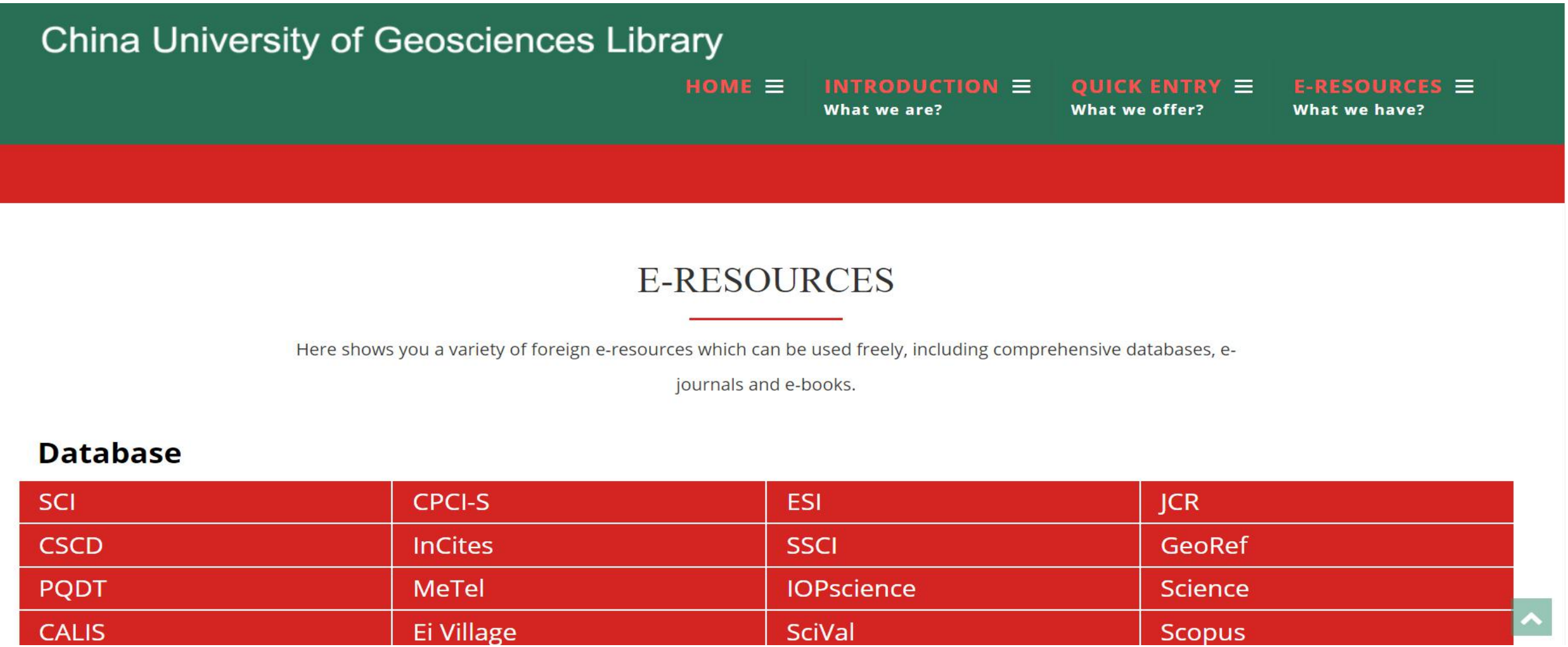
HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?



HOW DO WE FIND AN INNOVATIVE RESEARCH TOPIC ?

Electronic Journals

ACS	AGU	ASCE	ASME
EBSCO	Elsevier	Emerald	Frontiers
GSW	EarthDoc	Nature	PQDD
SAGE	Science Online	Lyell Collection	SpecialSciDBS
Springer	Wiley Online Library	IEEE/IEL	ACM
AMS	RSC	SEG	Nature Geoscience
Annual Reviews	OnePetro	Taylor & Francis	PNAS
APS	John Benjamins		

Electronic Books

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FINDING AN INNOVATIVE RESEARCH TOPIC

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Application of machine learning in compressive strength predicti

Authors: Nyakilla

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2022 (1)

Research article

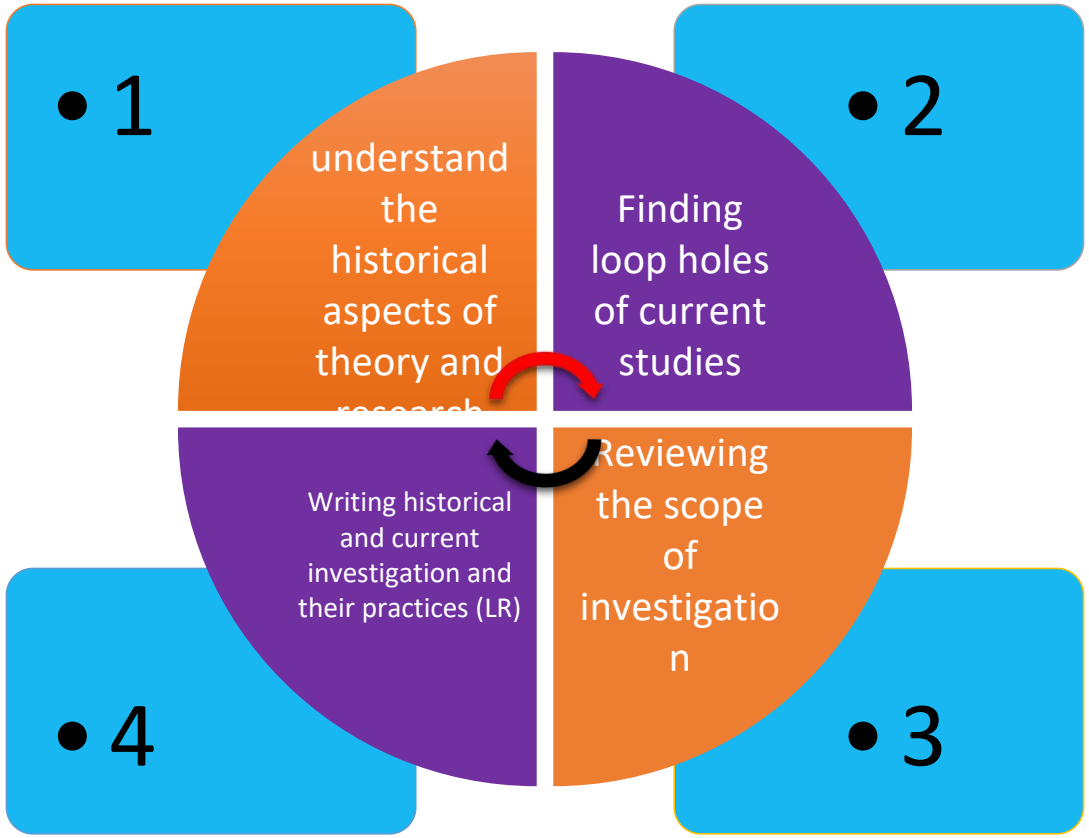
Application of machine learning in the prediction of compressive, and shear bond strengths from the experimental data in oil well cement at 80 °C. Ensemble trees boosting approach

Construction and Building Materials, 3 December 2021, ...

Edwin E. Nyakilla, Gu Jun, ... Petro E. Mabeyo

HOW DO WE GRASP AN INNOVATIVE TOPIC FROM READING?

- Make summary reports for at least not less than 10 current papers for you to understand how to write your own paper: Example their, Abstract, introduction, methodology, results and discussion and conclusion.



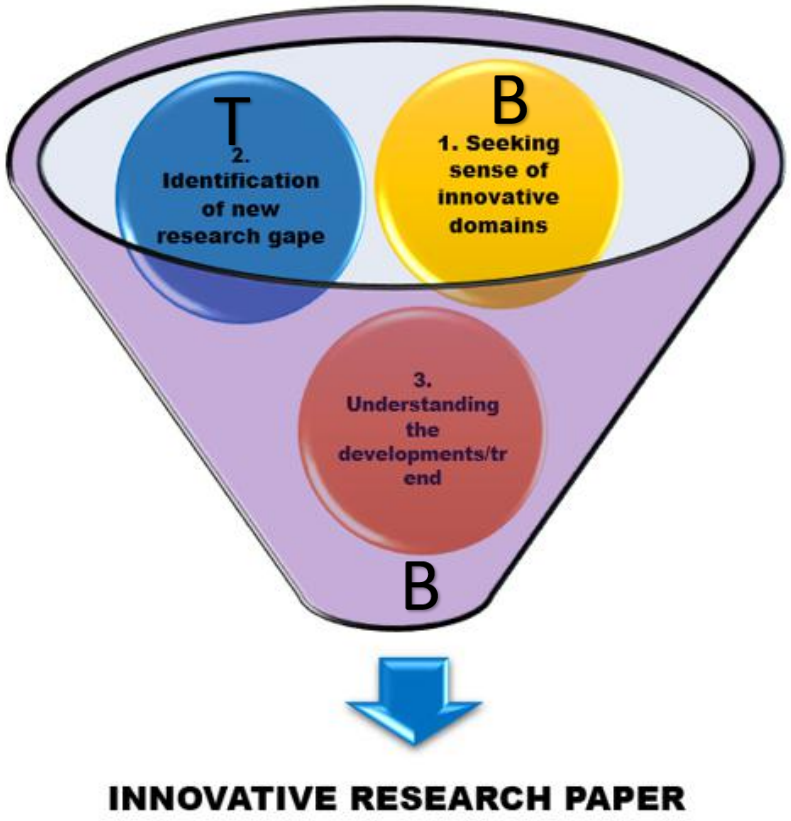
HOW DO WE GRASP AN INNOVATIVE TOPIC FROM READING?

- **Read critically and criticize research paper in a scientific approach and ask yourself?.**

- What limitations the authors have not noticed or clearly admitted)?
- Are the authors' assumptions reasonable?
- Is the logic of the paper clear and justifiable?
- Is there a flaw in the reasoning?
- If the authors present data, can I use them?
- What are the good ideas in this paper?
- Do these ideas have other applications or extensions that the authors might not have thought of?
- Can they be generalized further?
- Are there possible improvements that might make important practical differences? If you were going to start doing research from this paper, what would be the next thing you would do as novelty?

FINDING AN INNOVATIVE RESEARCH TOPIC

Collect all your Ideas from different reading in 1big backet (Brainstorm the brain) BTB



WHAT NEXT AFTER GETING AN INNOVATIVE RESEARCH TOPIC

- Think of Methodology your going to execute in your originality work.
- Conduct lab work if it needed in your new idea.
- Learn software's if it needed in your new idea. For Example

i. MATLAB for simulation and modeling

ii. Python for modeling and plotting graphs.

iii. R-software for statistical computing and graphics design

iv. Origin for modeling and plotting

v. GIMP for image manipulation program.

Vi. SPSS for statistical analysis

Vii. Inkscape for complex figure design.

Viii. GIS and Coral draw for map drawing and editing.

ix. Cystoscope for visualization of complex network.

x. CMG for simulation.

FINDING AN INNOVATIVE RESEARCH TOPIC

In summary try your best to:

✓Know what is already known in the research area

✓ Identify the gaps in the literature,

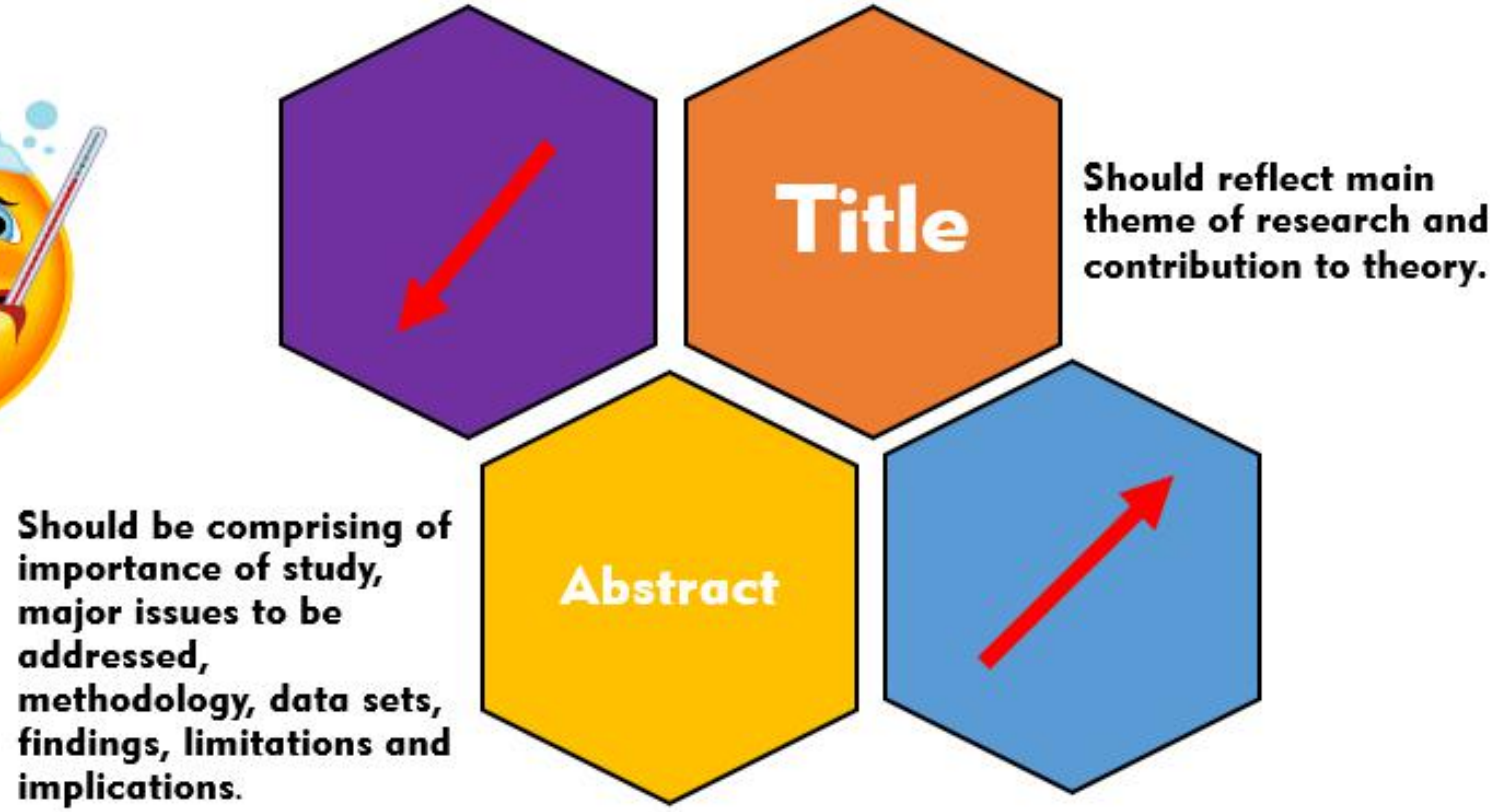
✓ Identifies what needs to be studied and

✓ Show how the studied topic will finally add new knowledge to the existing literature.

✓ NOTE the above aspects can be found through the reading and reading of the existing literature.

HOW DO WE WRITE AN INNOVATIVE RESEARCH TOPIC?

- Write the Title and abstract which are precise since their the first two importance elements of your manuscript to be checked by the editor.



HOW DO WE WRITE AN INNOVATIVE RESEARCH TOPIC?

Contents lists available at ScienceDirect

Construction and Building Materials

journal homepage: www.elsevier.com/locate/conbuildmat

Application of machine learning in the prediction of compressive, and shear bond strengths from the experimental data in oil well cement at 80 °C. Ensemble trees boosting approach

Edwin E. Nyakilla [a], Gu Jun [a,*], Naswibu A. Kasimu [a], Edwin F. Robert [a], Ndikubwimana Innocent [a], Thamudi Mohamedy [a], Mbarouk Shaame [a,b], Mbega Ramadhani Ngata [a], Petro E. Mabeyo [c]

[a] Department of Petroleum Engineering, Faculty of Earth Resources, China University of Geosciences, Wuhan 430074, China
[b] Department of Petroleum and Energy Engineering, School of Mines and Petroleum Engineering, The University of Dodoma, Box 259, Dodoma, Tanzania
[c] Department of Chemistry, Faculty of Science, Dar es Salaam University College of Education, P.O. Box 2329, Dar es Salaam, Tanzania

ARTICLE INFO

Keywords:
Machine learning
Oil well cement
Class F fly ash
Shear bond strength
Compressive strength

ABSTRACT

The current study aimed at predicting shear bond strength (SBS) and compressive strength (CS) using ensemble techniques of gradient boosting regression tree (GBRT) from the experimental data. Experimental data were obtained from CS and SBS studies using class F fly ash as supplementary cementitious materials at different proportions. The experimental results showed that the application of class F fly ash increases both CS and SBS with curing time due to the pozzolanic action of the fly ash. The SBS and CS for 15% replacement after 28 days were 0.353 and 41.9 MPa, respectively compared to 0.324 and 39.5 Mpa for 30% fly ash. This means higher fly ash content decreases both CS and SBS. Cement, OWC, water, fly ash, curing time, and dispersant were set as input data for machine learning (ML) while experimental SBS and CS as output. ML results showed that GBRT overperformed Artificial neural network (ANN), support vector machine (SVM), and Gaussian process regression (GPR)models since it gave the greatest $R^2 = 0.995$ for CS, 0.989 for SBS and the least loss functions (MSE = 0.160 , MAE = 0.174), and (MSE = 0.0005 , MAE = 0.0031) for CS and SBS, respectively.. The comparative findings of both experimental and estimation, therefore affirm that for the long life of oil and gas wells, GBRT can be implemented as an improved approach for cement hydration prediction.

HOW DO WE WRITE AN INNOVATIVE RESEARCH TOPIC?

energy&fuels

pubs.acs.org/EF Review

Review of Developments in Nanotechnology Application for Formation Damage Control

Mbega Ramadhani Ngata, Baolin Yang,* Mohammed Dahiru Aminu, Raphael Iddphonce, Athumani Omari, Mbarouk Shaame, Edwin E. Nyakilla, Imani Asukile Mwakateba, Grant Charles Mwakipunda, and David Yanyi-Akofur

Cite This: https://doi.org/10.1021/acs.energyfuels.1c03223 Read Online

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ABSTRACT: Formation damage has the potential to impair and weaken reservoir productivity and injectivity, causing substantial economic losses. Oil and gas wells can be damaged by various mechanisms, such as solid invasion, rock—fluid incompatibilities, fluid—fluid incompatibilities, and phase trapping/blocking, which can reduce natural permeability of oil and gas near the wellbore zone. These can happen during most field operations, including drilling operations, completion, production, stimulation, and enhanced oil recovery (EOR). Numerous studies have been undertaken in recent years on the application of nanotechnology to aid the control of formation damage. This review has found that nanotechnology is more successful than traditional materials in controlling formation damages in different phases of oil and gas development. This is facilitated by their small size and high surface area/volume ratio, which increase reactivity and interactivity

HOW DO WE WRITE AN INNOVATIVE RESEARCH TOPIC?

Energy 239 (2022) 121915

Contents lists available at ScienceDirect

Energy

journal homepage: www.elsevier.com/locate/energy

Enhanced group method of data handling (GMDH) for permeability prediction based on the modified Levenberg Marquardt technique from well log data

Alvin K. Mulashani [a, b, c], Chuanbo Shen [a, b, *], Baraka M. Nkurlu [b], Christopher N. Mkono [b], Martin Kawamala [b]

[a] Key Laboratory of Tectonics and Petroleum Resources, Ministry of Education, China University of Geosciences, Wuhan, 430074, China
[b] Department of Petroleum Geology, School of Earth Resources, China University of Geosciences, Wuhan, 430074, China
[c] Department of Geoscience and Mining Technology, College of Engineering and Technology, Mbeya University of Science and Technology, Box 131, Mbeya, Tanzania

ARTICLE INFO

Article history:
Received 6 March 2021
Received in revised form
20 August 2021
Accepted 23 August 2021
Available online 30 August 2021

Keywords:
Artificial neural network
permeability
Well logs
Group method of data handling

ABSTRACT

Permeability is the key variable for reservoir characterization used for estimating the flow patterns and volume of hydrocarbons. Modern computer advancement has highlighted the use of machine learning approaches such as group method of data handling (GMDH) in predicting permeability. However, the widely employed GMDH has intrinsic problems in its application. Therefore, the objective of this study is to present an enhanced GMDH based modified Levenberg-Marquardt (LM) as an improved alternative to conventional GMDH in predicting permeability from well logs. The study used natural gamma-ray, standard resolution formation density, limited effective porosity, shale volume of rock, and thermal neutron porosity well logs as input variables. Results show that an enhanced method has a reasonable reduction in processing time with high accuracy. Compared to conventional GMDH and backpropagation neural networks (BPNN), the GMDH-LM used 30% less computation time and performed excellently during training with the least error values of 0.092 and 0.018 for RMSE and MAE. Likewise, good results were observed during testing, obtaining the least error values of 0.679 and 0.056 for RMSE and MAE respectively. The modified generalization performance of GMDH-LM makes it an improved form of GMDH and can be adopted as an improved alternative in predicting permeability.

Journal of Natural Gas Science and Engineering 100 (2022) 104441

Contents lists available at ScienceDirect

Journal of Natural Gas Science and Engineering

journal homepage: www.elsevier.com/locate/jngse

A review on gas hydrate production feasibility for permafrost and marine hydrates

Patrick Edward Chibura [a, c], Wei Zhang [b], Anjian Luo [a], Jinjie Wang [a, *]

[a] Key Laboratory of Tectonics and Petroleum Resources (China University of Geosciences), Ministry of Education, Wuhan, 430074, China
[b] Exploration and Development Research Institute of TuHa Oilfield Company, CNPC, Hami, 839000, China
[c] Chemistry Department, University of Dar es Salaam, P.O. Box 35061, Dar es Salaam, Tanzania

ARTICLE INFO

Keywords:
Methane hydrate
Reservoir simulation
Hydrate reservoirs
Methane recovering methods
Production parameters
Field case production

ABSTRACT

Methane gas hydrate is a potential energy reserve that would supplement the current energy supply in the world. This study presents a review of methane hydrate production through various simulations and field trial tests. The simulated production data of three classes of gas hydrate reservoirs were evaluated and compared. In line with that, factors such as porosity, permeability, gas saturation, pressure, temperature, surface area were discussed and analyzed. It was revealed that in all methane hydrate reservoirs classes, production factors such as injection rate, temperature, and pressure drop, as well as reservoir parameters suit of permeability, porosity, and surface area show substantial gas production. On the contrary, CMG STARS and TOUGH + HYDRATE have better prediction results than other studied simulators. Methane hydrate reservoirs classes 1, 2, and 3, depressurization and thermal techniques have a recovery rate of 75% and 49.06%, respectively while CO_2 injections and combination methods have a recovery rate of 64%, and 87.5%. Reformation of hydrate near the wellbore, sand production, the rise of bottom well pressure, and geomechanical effects are methane production challenges.

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HOW TO ADRESS REVIEWERS FOR YOUR INNOVATIVE PAPER

- Addressing reviewers seriously for all Minor or Major revision.
-

1. Try to find all the possible answers
2. Address the revisions in a persuasive and positive manner
3. Avoid to act to be over smart
4. Always follow the deadlines for submission of revisions

RECENTLY PUBLISHED PAPERS

CHINA UNIVERSITY OF GEOSCIENCES

Published Online 18/11/2021

ELSEVIER

Contents lists available at ScienceDirect

Construction and Building Materials

journal homepage: www.elsevier.com/locate/conbuildmat

Application of machine learning in the prediction of compressive, and shear bond strengths from the experimental data in oil well cement at 80 °C. Ensemble trees boosting approach

Edwin E. Nyakilla [a], Gu Jun [a,*], Naswibu A. Kasimu [a], Edwin F. Robert [a], Ndikubwimana Innocent [a], Thamudi Mohamedy [a], Mbarouk Shaame [a,b], Mbega Ramadhani Ngata [a], Petro E. Mabeyo [c]

[a] Department of Petroleum Engineering, Faculty of Earth Resources, China University of Geosciences, Wuhan 430074, China
[b] Department of Petroleum and Energy Engineering, School of Mines and Petroleum Engineering, The University of Dodoma, Box 259, Dodoma, Tanzania
[c] Department of Chemistry, Faculty of Science, Dar es Salaam University College of Education, P.O. Box 2329, Dar es Salaam, Tanzania

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RECENTLY PUBLISHED PAPERS

Published Online 11/1/2022

Natural Resources Research (© 2021)
https://doi.org/10.1007/s11053-021-09988-1

Original Paper

Evaluation of Source Rock Potentiality and Prediction of Total Organic Carbon Using Well Log Data and Integrated Methods of Multivariate Analysis, Machine Learning, and Geochemical Analysis

Edwin E. Nyakilla,[1] Selemani N. Silingi,[1,3] Chuanbo Shen,[1,2,4] Gu Jun,[1,4] Alvin K. Mulashani,[1] and Patrick E. Chibura[1]

Received 9 July 2021; accepted 19 November 2021

In this study, integrated approaches based on multivariate analysis (MVA), machine learning (ML), and geochemical analysis are proposed to investigate the potential of hydrocarbon reserves and total organic carbon (TOC) prediction. These approaches employed the MVA technique as a future selection method in source rock evaluation. We used geochemical data from 30 core samples taken equally from wells SS-5 and SS-7. Geochemical parameters, namely TOC, free hydrocarbon, thermal pyrolysis hydrocarbon, hydrogen index, production index, and oxygen index, were determined for statistical evaluation. IBM SPSS statistical software and MATLAB (R2020a) were used for MVA and ML, respectively. The performance of the models built using MVA and ML were evaluated by, among others, coefficient of determination (R^2) and mean square error (MSE). Findings revealed that fair through good to excellent source rock with TOC ranging from 0.85 to 2.95 wt% are hosted in the Triassic beds of Tanga. A high 1.61% Ro at a mature peak of 463 °C predominates with the existence of type III/II kerogen that can produce both oil and gas. Considering TOC prediction from conventional well log data, optimized Gaussian process regression showed the best performance followed by MVA and support vector machine, giving the MSEs of 0.5629, 0.6172, and 0.7023, respectively. In terms of prediction accuracy, their R^2 values of 0.952, 0.9346, and 0.835, respectively, were in good agreement with the geochemical results. The concurrence of geochemical analysis, ML, and MVA revealed that the Tanga basin has great hydrocarbon potential of great economic importance. The study revealed that combining MVA and other methods can be applied to assess the hydrocarbon resource potential of other prospects around the globe.

KEY WORDS: Source rock, Geochemical analysis, Cluster analysis, Factor analysis, Pearson's

RECENTLY PUBLISHED PAPERS

Published Online 28/12/2021

energy&fuels

pubs.acs.org/EF

Review

Review of Developments in Nanotechnology Application for Formation Damage Control

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ABSTRACT: Formation damage has the potential to impair and weaken reservoir productivity and injectivity, causing substantial economic losses. Oil and gas wells can be damaged by various mechanisms, such as solid invasion, rock−fluid incompatibilities, fluid−fluid incompatibilities, and phase trapping/blocking, which can reduce natural permeability of oil and gas near the wellbore zone. These can happen during most field operations, including drilling operations, completion, production, stimulation, and enhanced oil recovery (EOR). Numerous studies have been undertaken in recent years on the application of nanotechnology to aid the control of formation damage. This review has found that nanotechnology is more successful than traditional materials in controlling formation damages in different phases of oil and gas development. This is facilitated by their small size and high surface area/volume ratio, which increase reactivity and interactivity to the adjacent materials/surfaces. Furthermore, adding hydrophilic nanoparticles (0.05 wt %) to surfactants during EOR alters their wettability from 15 to 33%. Wettability alteration capabilities of nanoparticles are also exemplified by carbonate rock from oil-wet to water-wet after the concentration of 4 g/L silica nanoparticles is added. In addition, mixing nanoparticles to the drilling fluid reduced 70% of fluid loss. However, the mechanisms of impairment of conductivity in shale/tight formations are not consistent and can differ from one formation to another as a result of a high level of subsurface heterogeneity. Thus, the reactivity and interaction of nanoparticles in these shale/tight formations have not been clearly explained, and a recommendation is made for further investigations. We also recommend more nanotechnology field trials for future research because deductions from current studies are insufficient. This review provides more insights on the applications of nanoparticles in different stages of oil and gas development, increasing our understanding on the measures to control formation damage.

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CO_2 Sequestration and Enhanced Shale Gas Recovery by CO_2 Injection: Numerical Simulation Method

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Abstract: In previous decades, shale gas production has been given special attention as a clean source of energy. Technological advancements in multi-well especially horizontal drilling and hydraulic fracturing, have raised more research on how to produce shale gas commercially while studying its challenges. CH_4 gas production by using CO_2 injection is a combination of several parameters, including both fracking and geologic parameters. This paper investigated the influence of aligned and staggered multiwell placement patterns to enhance CH_4 gas recovery and CO_2 sequestration. A three-dimensional reservoir model was built and simulated, and the influence of reservoir and fracking parameters was analyzed. The results revealed that the staggered well pattern is the best pattern for CH_4 gas recovery during continuous injection, with a 37% increase of recovery with late CO_2 breakthrough, compared with the aligned well pattern, which had 31% increase recovery, associated with early CO_2 breakthrough. In terms of CO_2 gas storage, the aligned well pattern had a significant amount of CO_2 storage during continuous injection and huff and puff injection by storing 4% more carbon dioxide during continuous injection and 7% more during huff and puff injection than that in the staggered well pattern. Different injection timings of 1, 2, and 3 years, and injection cycles of one, three, and five cycles were analyzed during huff and puff injection. The results showed that five cycles of injection had the highest methane gas recovery, 23% and 21%, in aligned and staggered well patterns, respectively. Furthermore, the influence of injection start time also was analyzed, and results showed that injection after 10 years of production produced higher methane gas recovery and CO_2 storage in both aligned and staggered well patterns, followed by injection after 5 years of production, after 3 years of production, and during the first year of production. Sensitivity analysis revealed that horizontal matrix permeability, vertical matrix permeability, initial reservoir pressure, reservoir temperature, injection pressure, injection rate, fracture porosity, and fracture spacing played a vital role in both methane gas recovery and carbon dioxide gas storage in both well patterns. In addition, results showed that methane recovered during continuous injection is higher than during huff and puff injection in both aligned and staggered well patterns. Results obtained from this paper can help to improve shale gas production in multiwell placements, and save time and cost. This paper should motivate more research into the mitigation of global warming through CO_2 geosequestration. **DOI: 10.1061/(ASCE)EY.1943-7897.0000833.**

Author keywords: Shale gas; Hydraulic fracturing; Well pattern; CO_2 sequestration; Sensitivity analysis.

CONCLUSION

Thank you all

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