



Dr. Seena Joseph

Research Proposal

- Proposal
 - Title of research proposal
 - Introduction
 - Literature Review
 - Research Problem statement
 - Research Aim and objectives
 - Research methodology
 - Research contributions and outcomes
 - Timeline
 - References

Research Proposal

- Proposal
 - Title of research proposal
 - A clear and concise title reflecting the research scope.
 - Examples
 - AI-Powered Threat Detection Models for Cybersecurity Applications.
 - Optimizing Software Development Processes in a DevOps Environment
 - Enhancing Software Project Management with AI: A Predictive Model for Task Allocation
 - AI-Based Predictive Maintenance in Industrial Systems: A Machine Learning Approach
 - Exploring Blockchain Technology for Secure IoT Communication
 - Predicting Cyber Attacks Using Data Mining Techniques: A Case Study of Recent Breaches
 - Analyzing Large-Scale Social Media Data for Sentiment Analysis: A Case Study of Twitter
 - Exploring the Use of Ensemble Learning for Improving Predictive Accuracy in Healthcare Data

Research Proposal

- Getting ideas for the research proposal
 1. Explore current trends and issues
 - a. Read recent academic articles, conference proceedings in your Area(Software Engineering, Artificial Intelligence, Cyber security, Data Mining, etc.)
 - b. Identify the emerging technologies or current challenges
 - c. Example : In cybersecurity, how AI can be used for detecting zero-day attacks is a trending challenge.

Research Proposal

- Getting ideas for the research proposal
 - Explore current trends and issues
 - Reading recent papers – Start with abstract

Example 1

Research
context/background

Research Problem/Research
gap/Literature Gap

Research Aim

Methodology

Results/Key findings

Significance; Contribution

A Systematic Literature Review and Meta-Analysis of Studies on Online Fake News Detection

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Abstract: The ubiquitous access and exponential growth of information available on social media networks have facilitated the spread of fake news, complicating the task of distinguishing between this and real news. Fake news is a significant social barrier that has a profoundly negative impact on society. Despite the large number of studies on fake news detection, they have not yet been combined to offer coherent insight on trends and advancements in this domain. Hence, the primary objective of this study was to fill this knowledge gap. The method for selecting the pertinent articles for extraction was created using the preferred reporting items for systematic reviews and meta-analyses (PRISMA). This study reviewed deep learning, machine learning, and ensemble-based fake news detection methods by a meta-analysis of 125 studies to aggregate their results quantitatively. The meta-analysis primarily focused on statistics and the quantitative analysis of data from numerous separate primary investigations to identify overall trends. The results of the meta-analysis were reported by the spatial distribution, the approaches adopted, the sample size, and the performance of methods in terms of accuracy. According to the statistics of between-study variance high heterogeneity was found with $\tau^2 = 3.441$; the ratio of true heterogeneity to total observed variation was $I^2 = 75.27\%$ with the heterogeneity chi-square (Q) = 501.34, the degree of freedom = 124, and $p \leq 0.001$. A p -value of 0.912 from the Egger statistical test confirmed the absence of a publication bias. The findings of the meta-analysis demonstrated satisfaction with the effectiveness of the recommended approaches from the primary studies on fake news detection that were included. Furthermore, the findings can inform researchers about various approaches they can use to detect online fake news.



Citation: Thompson, R.C.; Joseph, S.; Adeliyi, T.T. A Systematic Literature

Research Proposal

- Getting ideas for the research proposal
 - Reading recent papers – Start with abstract

Example 2

Research
context/background

Research Problem/Research
gap/Literature Gap

Research Aim

Methodology

Results/Key findings

Significance; Contribution

InSDN: A Novel SDN Intrusion Dataset

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⋮ **ABSTRACT** Software-Defined Network (SDN) has been developed to reduce network complexity through control and manage the whole network from a centralized location. Today, SDN is widely implemented in many data center's network environments. Nevertheless, emerging technology itself can lead to many vulnerabilities and threats which are still challenging for manufacturers to address it. Therefore, deploying Intrusion Detection Systems (IDSs) to monitor malicious activities is a crucial part of the network architecture. Although the centralized view of the SDN network creates new opportunities for the implementation of IDSs, the performance of these detection techniques relies on the quality of the training datasets. Unfortunately, there are no publicly available datasets that can be used directly for anomaly detection systems applied in SDN networks. The majority of the published studies use non-compatible and outdated datasets, such as the KDD'99 dataset. This manuscript aims to generate an attack-specific SDN dataset and it is publicly available to the researchers. To the best of our knowledge, our work is one of the first solutions to produce a comprehensive SDN dataset to verify the performance of intrusion detection systems. The new dataset includes the benign and various attack categories that can occur in the different elements of the SDN platform. Further, we demonstrate the use of our proposed dataset by performing an experimental evaluation using eight popular machine-learning-based techniques for IDSs.

Research Proposal

- Getting ideas for the research proposal
 - Reading recent papers – Start with abstract

Example 3

Research
context/background

Research Problem/Research
gap/Literature Gap

Research Aim

Methodology

Results/Key findings

Significance; Contribution

Convolutional neural network-based semantic segmentation model for land cover classification in páramo ecosystems

Resumen: Páramo ecosystems are essential for water regulation and biodiversity conservation in mountainous areas. However, they face significant threats due to climate change and human activities such as agriculture, livestock farming, and mining. The absence of clear boundaries and continuous monitoring systems for their land cover hinders effective protection highlighting the need to employ advanced digital techniques that provide highly accurate, up-to-date information. Convolutional neural networks (CNNs) have emerged as promising tools for semantic segmentation of satellite images. This research aimed to evaluate the performance of two CNN architectures U-Net++ and DeepLabV3+ for land cover classification in the Tota-Bijagual-Mamapacha (TBM) páramo complex in Colombia, using Landsat 8 imagery from 2017 to 2019 and land cover labels from 1:100.000.

To cite this article: Reyes-Quintana, M., Lizarazo, I. 2025. Convolutional neural network-based semantic segmentation model for land cover classification in páramo ecosystems. *Revista de Teledetección*, 65, 21858. <https://doi.org/10.4995/raet.2025.21858>

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Reyes-Quintana y Lizarazo

national coverage map produced by IDEAM in 2018. The results showed U-Net++ achieved a kappa of 0.60, while DeepLabV3+ obtained a kappa of 0.59. In páramo covers, U-Net++ achieved an F1 of 78.43% for Herbazal and 79.22% for Forests, while DeepLabV3+ achieved F1 of 75% and 74.27%, respectively, confirming the potential of CNNs for land cover classification in these ecosystems. Although both models presented similar processing times, class imbalance and reliance on consistent labels affected their performance in heterogeneous covers. This research establishes a methodological foundation for future studies and suggests addressing these limitations to improve efficiency and thematic accuracy in the classification and monitoring in páramo ecosystems.

Research Proposal

- Getting ideas for the research proposal
 - Reading recent papers – Start with abstract

Example 4

Research
context/background

Research Problem/Research
gap/Literature Gap

Research Aim

Methodology

Results/Key findings

Significance; Contribution

Article

Detecting Salient Image Objects Using Color Histogram Clustering for Region Granularity

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Abstract: Salient object detection represents a novel preprocessing stage of many practical image applications in the discipline of computer vision. Saliency detection is generally a complex process to copycat the human vision system in the processing of color images. It is a convoluted process because of the existence of countless properties inherent in color images that can hamper performance. Due to diversified color image properties, a method that is appropriate for one category of images may not necessarily be suitable for others. The selection of image abstraction is a decisive preprocessing step in saliency computation and region-based image abstraction has become popular because of its computational efficiency and robustness. However, the performances of the existing region-based salient object detection methods are extremely hooked on the selection of an optimal region granularity. The incorrect selection of region granularity is potentially prone to under- or over-segmentation of color images, which can lead to a non-uniform highlighting of salient objects. In this study, the method of color histogram clustering was utilized to automatically determine suitable homogenous regions in an image. Region saliency score was computed as a function of color contrast, contrast ratio, spatial feature, and center prior. Morphological operations were ultimately performed to eliminate the undesirable artifacts that may be present at the saliency detection stage. Thus, we have introduced a novel, simple, robust, and computationally efficient color histogram clustering method that agglutinates color contrast, contrast ratio, spatial feature, and center prior for detecting salient objects in color images. Experimental validation with different categories of images selected from eight benchmarked corpora has indicated that the proposed method outperforms 30 bottom-up non-deep learning and seven top-down deep learning salient object detection methods based on the standard performance metrics.



Citation: Joseph, S.; Olugbara, O.O. Detecting Salient Image Objects Using Color Histogram Clustering for Region Granularity. *J. Imaging* 2021, 7, 187. <https://doi.org/10.3390/jimaging7090187>

Research Proposal

- Getting ideas for the research proposal
 - Reading recent papers – Start with abstract

Examples for Poorly structured abstract



Abstract

We trained a large, deep convolutional neural network to classify the 1.2 million high-resolution images in the ImageNet LSVRC-2010 contest into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 37.5% and 17.0%, respectively, which is considerably better than the previous state-of-the-art. The neural network, which has 60 million parameters and 650,000 neurons, consists of five convolutional layers, some of which are followed by max-pooling layers, and three fully connected layers with a final 1000-way softmax. To make training faster, we used non-saturating neurons and a very efficient GPU implementation of the convolution operation. To reduce overfitting in the fully connected layers we employed a recently developed regularization method called “dropout” that proved to be very effective. We also entered a variant of this model in the ILSVRC-2012 competition and achieved a winning top-5 test error rate of 15.3%, compared to 26.2% achieved by the second-best entry.

Abstract

We introduce a new language representation model called **BERT**, which stands for **B**idirectional **E**ncoder **R**epresentations from **T**ransformers. Unlike recent language representation models (Peters et al., 2018a; Radford et al., 2018), BERT is designed to pre-train deep bidirectional representations from unlabeled text by jointly conditioning on both left and right context in all layers. As a result, the pre-trained BERT model can be fine-tuned with just one additional output layer to create state-of-the-art models for a wide range of tasks, such as question answering and language inference, without substantial task-specific architecture modifications.

BERT is conceptually simple and empirically powerful. It obtains new state-of-the-art results on eleven natural language processing tasks, including pushing the GLUE score to 80.5% (7.7% point absolute improvement), MultiNLI accuracy to 86.7% (4.6% absolute improvement), SQuAD v1.1 question answering Test F1 to 93.2 (1.5 point absolute improvement) and SQuAD v2.0 Test F1 to 83.1 (5.1 point absolute improvement).

Research Proposal

- Introduction
 - Background and context
 - Context of the selected topic
 - Recent advancements in the selected field (AI, Cybersecurity, Software Engineering, Data Science).
 - Significance - Relevance of the topic for academia, industry, or society (e.g., improving security frameworks or optimizing software systems).

Research Proposal

- Introduction - Structure
 - 1st Para – Setting the stage
 - Highlight why the topic is significant and worthy of attention
 - Begin with a compelling fact, statistics or statement to grab attention
 - Contextualise the topic within the broader field or real world application
 - Mention its reference to current trends, issues or challenges
 - 2nd Para – Define the focus and scope of the research (WHAT part)
 - Clearly state what the stage is about
 - Clearly state what is know and unknown
 - Specify the context
 - 3rd Para - Explain why this research is necessary (WHY part)
 - 4th Para – Research Gap/Research problem
 - 5th Para – Contribution/ Aim and objectives

Research Proposal

- Introduction - Structure
- Activity
 - Identify a research paper in your field of study (AI, Cyber security, Data Science, Software Engineering , etc.)
 - Analyse the introduction and map into the structured elements of the introduction.
 - **Setting the stage**
 - Guiding Questions: What makes the topic significant? How does the author grab attention?
 - **Defining the Focus and Scope (WHAT)**
 - Guiding Questions: What problem or domain is the research focusing on? Is the context of the study clearly defined?
 - **Justification for the Research (WHY)**
 - Guiding Questions: Why is this research important? How does it contribute to academic or practical knowledge?
 - **Research Gap/Research problem**
 - Guiding Questions: What gap is the study addressing? How does the research problem fit within the field?
 - **Contribution/Aim and Objectives**
 - Guiding Questions: What does the paper aim to achieve? How does it contribute to the field?

Next session

- Literature Review