Department of Computer Science and Engineering
Bangladesh University of Business and Technology (BUBT)

CSE 498: Literature Review Records

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Project Title	Real Time Depression Detection
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Aspects	Paper # 1 (Title)
Title / Question (What is problem statement?)	Deep Learning for Depression Detection Using Twitter Data
Objectives / Goal (What is looking for?)	The primary objective of this research is to develop a robust and accurate method for detecting depression in individuals using their Twitter data. The authors aim to leverage deep learning techniques, specifically a novel Deep Learning Multi-Aspect Depression Detection with Hierarchical Attention Network (MDHAN), to classify Twitter users as depressed or non-depressed based on their online activity. The goal is to achieve high accuracy in identifying depressed individuals while minimizing false positives and reducing execution time.
Methodology / Theory (How to find the solution?)	The methodology employed in this study includes data collection from Twitter, preprocessing of the Twitter data, feature selection using Adaptive Particle Swarm and Grey Wolf optimization methods, and the application of a Deep Learning Multi-Aspect Depression Detection with Hierarchical Attention Network (MDHAN) model. The research uses a dataset divided into training and testing sets, with four-fold and ten-fold cross-validation for evaluation. The MDH-PWO architecture achieves high accuracy in depression detection by combining deep learning and feature selection techniques.
Software Tools (What program/software is used for design, coding and simulation?)	Implementation work was carried out at Intel(R) Core (TM) i7 CPU M60 @ 2.80 GHz in Python.
Test / Experiment How to test and characterize the design/prototype?	The authors conducted experiments to evaluate the effectiveness of their proposed MDH-PWO architecture. The Twitter dataset was divided into training and testing sets, with 80 % used for training and 20 % for testing. Four-fold and ten-fold cross-validation were employed for robust evaluation. The experiments demonstrated that the proposed method achieved an accuracy of 99.86 %, outperforming other algorithms such as Convolutional Neural Network (CNN), Support Vector Machine (SVM), and Minimum Description Length (MDL).
Simulation/Test Data (What parameters are determined?)	The Twitter dataset used in this research consists of a collection of tweets from users, with each tweet represented as a sequence of words. Features extracted from this data include linguistic, contextual, spatial, and structural components, which are used for depression detection.
Result / Conclusion (What was the final result?)	The experimental results showed that the proposed MDH-PWO architecture achieved exceptional accuracy, precision, recall, and F1-measure, surpassing other existing methods. The accuracy reached 99.86%, with a lower false-positive rate. This indicates the effectiveness of deep learning, coupled with feature selection using adaptive swarm intelligence methods, in accurately detecting depression in individuals based on their Twitter data.
Obstacles/Challenges (List the methodological obstacles if authors mentioned in the article)	While the paper does not explicitly mention methodological obstacles, it can be inferred that challenges in this research field may include issues related to data noise, the need for large and diverse datasets, and the interpretability of deep learning models.
Terminology (List the common basic words frequently used in this research field)	Depression detection, Twitter data, deep learning, swarm intelligence, multi-aspect depression detection, and prediction.

Review Judgment (Briefly compare the objectives and results of all the articles you reviewed)	
Review Outcome (Make a decision how to use/refer the obtained knowledge to prepare a separate and new methodology for your own research project)	

Aspects	Paper # 2 (Title)
Title / Question (What is problem statement?)	A deep architecture for depression detection using posting, behavior, and living environment data
Objectives / Goal (What is looking for?)	The goal of the research paper is to develop a deep learning-based approach for detecting depression using posting, behavior, and living environment data. The objective is to predict the depression label of an individual by analyzing their social media posts, behavior, and living environment features
Methodology / Theory (How to find the solution?)	The proposed approach, named Deep Learning-based Depression Detection with Heterogeneous Data Sources (D3-HDS), utilizes Recurrent Neural Networks (RNN) to compute the post representations of each individual. These representations are then combined with other content-based, behavior, and living environment features to predict the depression label using Deep Neural Networks (DNN)
Software Tools (What program/software is used for design, coding and simulation?)	Implementation work was carried out at Intel(R) Core (TM) i7 CPU M60 @ 2.80 GHz in Python.
Test / Experiment How to test and characterize the design/prototype?	The proposed approach, D3-HDS, was evaluated on a real dataset consisting of social media data, depression screening data (CES-D scores), and publicly available living environment data .
Simulation/Test Data (What parameters are determined?)	The provided sources do not explicitly mention the use of simulation or test data in the study. The authors collected real data from Facebook records of 1,453 students from 58 universities in Taiwan, along with depression screening data obtained through CES-D questionnaires.
Result / Conclusion (What was the final result?)	The experiment results on a real dataset showed that the performance of the D3-HDS approach significantly outperformed other baselines, demonstrating its effectiveness for depression detection .The D3-HDS approach achieved superior performance for depression detection compared to other baselines and traditional text classification methods.
Obstacles/Challenges (List the methodological obstacles if authors mentioned in the article)	Designing proxy features to model mental states, which are not directly obtainable from social media data, is another challenge in depression detection. Considering the living environment as an important factor causing depression adds complexity to depression detection. The problem of exploding or vanishing gradients in Recurrent Neural Networks (RNN) makes it difficult for the model to learn long-distance correlations in a sequence .
Terminology (List the common basic words frequently used in this research field)	Depression Detection, Deep Learning, Heterogeneous Data Sources, Recurrent Neural Networks (RNN), Deep Neural Networks (DNN)

Review Judgment (Briefly compare the objectives and results of all the articles you reviewed)	
Review Outcome (Make a decision how to use/refer the obtained knowledge to prepare a separate and new methodology for your own research project)	

Aspects	Paper # 3 (Title)
Title / Question (What is problem statement?)	Towards Automatic Depression Detection: A BiLSTM/1D CNN-Based Model
Objectives / Goal (What is looking for?)	The goal of the proposed automatic depression detection method is to support clinical diagnosis with objective and quantitative measurements and provide a quick, effective, and economic self-depressive assessment.
Methodology / Theory (How to find the solution?)	The proposed approach consists of a 1D CNN model and a BiLSTM model with an attention layer, which summarize the inputs from different modalities into embeddings. The embeddings capture short-term and long-term acoustic and linguistic characteristics to distinguish depressed patients from healthy individuals.
Software Tools (What program/software is used for design, coding and simulation?)	Implementation work was carried out at Intel(R) Core (TM) i7 CPU M60 @ 2.80 GHz in Python.
Test / Experiment How to test and characterize the design/prototype?	The provided sources do not explicitly mention the use of simulation or test data in the context of the proposed automatic depression detection method. The experiments conducted in the paper involve training and evaluating the models on the DAIC-WoZ and AViD-Corpus datasets, but there is no mention of using simulated or test data specifically.
Simulation/Test Data (What parameters are determined?)	The provided sources do not explicitly mention the use of simulation or test data in the study. The authors collected real data from Facebook records of 1,453 students from 58 universities in Taiwan, along with depression screening data obtained through CES-D questionnaires.
Result / Conclusion (What was the final result?)	The method is evaluated on the DAIC-WoZ and AViD-Corpus datasets, where classification and regression models are trained to predict the presence and severity of depression symptoms. The performance of the method is evaluated using metrics such as MAE and RMSE on the validation and test sets of the datasets
Obstacles/Challenges (List the methodological obstacles if authors mentioned in the article)	Data imbalance is a common challenge in depression-related datasets, where the number of samples from depressed individuals is significantly lower than non-depressed individuals, requiring the development of data resampling methods to balance the training samples. Traditional treatments for depression, such as psychotherapy or pharmacological interventions, can be timely, costly, and sometimes ineffective, making it difficult for individuals with financial difficulties to seek diagnosis and treatment .
Terminology (List the common basic words frequently used in this research field)	Depression Detection, Deep Learning, Multi-modal fusion, Data imbalance, Convolution

Review Judgment (Briefly compare the objectives and results of all the articles you reviewed)	
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Aspects	Paper # 4 (Title)
Title / Question (What is problem statement?)	An Automated and Real-time Approach of Depression Detection from Facial Micro-expressions
Objectives / Goal (What is looking for?)	The goal of the research paper is to propose an automated and real-time approach for the detection of depression from facial micro-expressions. The study aims to develop a depression detection system based on facial expression analysis using Support Vector Machine (SVM) and Convolutional Neural Network (CNN) models. The researchers extracted micro-expressions using the Facial Action Coding System (FACS) and correlated them with the sad, disgust, and contempt features for depression detection.
Methodology / Theory (How to find the solution?)	The study utilizes Support Vector Machine (SVM) and Convolutional Neural Network (CNN) models for depression detection based on facial expression analysis .
Software Tools (What program/software is used for design, coding and simulation?)	Implementation work was carried out at Intel(R) Core (TM) i7 CPU M60 @ 2.80 GHz in Python.
Test / Experiment How to test and characterize the design/prototype?	The researchers conducted experiments on a dataset obtained from Bahawal Victoria Hospital to evaluate the performance of their proposed approach for depression detection from facial micro-expressions.The dataset used for training consisted of 70% of the data, while the remaining 30% was divided equally for testing and validation.
Simulation/Test Data (What parameters are determined?)	The dataset used for training consisted of 70% of the data, while the remaining 30% was divided equally for testing and validation.The researchers conducted experiments on a dataset obtained from Bahawal Victoria Hospital to evaluate the performance of their proposed approach for depression detection from facial micro-expressions .
Result / Conclusion (What was the final result?)	The proposed automated and real-time approach for depression detection from facial micro-expressions achieved high accuracy in the experiments, with a validation accuracy of 99.9% on the CNN model and 100% accuracy on SVM using the extracted features .
Obstacles/Challenges (List the methodological obstacles if authors mentioned in the article)	The proposed approach for depression detection from facial micro-expressions relies on the extraction and analysis of micro-expressions using the Facial Action Coding System (FACS) and the correlation of specific Action Units (AUs) with depression features. However, the accuracy and reliability of these correlations may vary.
Terminology (List the common basic words frequently used in this research field)	Depression Detection, Deep Learning, Facial expressions, Micro-expressions, Support Vector Machine (SVM), Convolutional Neural Network (CNN), Facial Action Coding System (FACS)

Review Judgment (Briefly compare the objectives and results of all the articles you reviewed)	
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Aspects	**Paper # 5 (Title)**
Title / Question (What is problem statement?)	SenseMood: Depression Detection on Social Media
Objectives / Goal (What is looking for?)	The objective of the research paper is to design and demonstrate a system called SenseMood for efficiently detecting and analyzing users with depression on social media platforms, specifically Twitter.The goal is to utilize a deep visual-textual multimodal learning approach to reveal the psychological state of users based on their posted images and tweets.
Methodology / Theory (How to find the solution?)	The proposed system, SenseMood, utilizes a deep visual-textual multimodal learning approach for depression detection on social media platforms, specifically Twitter . The system collects and analyzes the posted images and tweets from users with and without depression . CNN-based classifiers and BERT are applied to extract deep features from the images and text posted by users, respectively .
Software Tools (What program/software is used for design, coding and simulation?)	Implementation work was carried out at Intel(R) Core (TM) i7 CPU M60 @ 2.80 GHz in Python.
Test / Experiment How to test and characterize the design/prototype?	The proposed system, SenseMood, was evaluated using a Twitter dataset that contains three subsets: depression dataset 1, non-depression dataset 2, and depression candidate dataset 3 .The depression dataset consists of 1,402 depressed users and 292,564 tweets, while the non-depression dataset contains more than 300 million non-depressed users and more than 10 billion tweets .
Simulation/Test Data (What parameters are determined?)	The evaluation of the system was conducted using a Twitter dataset that includes depression and non-depression datasets, but it does not specify if this dataset was simulated or real-world data.
Result / Conclusion (What was the final result?)	TThe proposed approach used a public dataset for evaluation and achieved high accuracy and F1-score in depression detection.
Obstacles/Challenges (List the methodological obstacles if authors mentioned in the article)	Ensuring the scalability and robustness of computational methods for automatically detecting depression-related indicators from interpersonal communication is a challenge .
Terminology (List the common basic words frequently used in this research field)	Depression Detection, Deep Learning, Facial expressions, Social media, Visual-textual multimodal learning, Deep features, Images, Tweets, Mental state

Review Judgment (Briefly compare the objectives and results of all the articles you reviewed)	
Review Outcome (Make a decision how to use/refer the obtained knowledge to prepare a separate and new methodology for your own research project)	