Automated Analysis of Comments on Press Articles in Websites (Articles Literature as Case Study)

Afra A. Abdulrahman [a*], Abdul Monem S. Rahma [iD] [b]

[a] Computer Science Department, University of Technology, Baghdad, Iraq, afra.russel@yahoo.com

[b] Computer Science Department, University of Technology, Baghdad, Iraq, 110003@uotchnology.edu.iq

*Corresponding author.

K E Y W O R D S	A B S T R A C T
	Due to the increasing electronic publishing sites for printed and certified newspapers, the reader faced the problem of reaching his goal by accessing these sites, which led to the neglect of a large section of important publications. The provision of an automated measure to verify the positive and negative articles based on the analysis of readers' comments on the articles is a necessity to see the important articles that are compatible with the corpus generated by us for inference. The project achieved the previous target and achieved a success rate. The Bag-of-Words Model (BoW) was used to obtain the repetition of the block of words to build the corpus. The proposed system is evaluated based on four metrics (Accuracy= 93%, Precision= 94%, Recall= 94% and F-measure= 94%). The effectiveness results obtain by this system was (Accuracy, Precision and Recall and F-measure).

1. Introduction

Recently, there has been an increase in the number of press articles published in the newspaper sites on the internet, due to the emergence of many writers of press articles. As a result, it is necessary to employ a large many of critics to read press articles and direct readers to read useful and good press articles. Because of this increase, critics cannot be familiar with all published newspaper articles. This will be the reason for the neglect of many useful articles. Internet browsing is based on certain standards based on keywords. Our work could be the beginning of giving a measure on the topic through comments on it in previous readings.

Historically, the culture of interacting with news articles has been limited because readers who want to interact send interactive messages to the editor or by voice by telephone. As a result, it was difficult to form the so-called public forums because editors could not publish all readers' messages because of the maximum number of newspapers allowed. Nowadays, the masses of media have the ability to comment and discuss articles published on the Internet through public comment forums,

which are ubiquitous through the Internet. It is now possible for the online newspaper community to participate in these public forums by commenting on news articles as they interact [1].

The availability of articles on the internet that have become easy to access by society led to increased comment and interaction directly with the articles. The articles are commented on by people who differ in terms of age, cultural achievement, their experience with the article, and their goals of commenting [2]. The electronic press has many features that distinguish it from the rest of the traditional and new media, where it combines the readers and the audio visual in one way, which means multiple patterns and processes of receiving content by the receiver (user) [3].

The use of electronic newspapers is a combination of reading the written texts and viewing images and videos, listening to audio files and interaction with multiple media content by the user, whether to send messages to the contractor or the newspaper management and to comment on the content or read the comments of other users [4]. The aim of this paper to help researchers on the Internet to get the best newspaper articles that others have before read, by building an automated evaluation system based on the analysis of comments on newspaper articles resulting from earlier readings and this scale is a substitute for critics. This aspect may be available in the English language and other languages, but it lacks the language for Arabic.

2. Literature Survey

There are many works that show interest in electronic newspapers and readers' comments on articles as well as interest in the construction of corpus, and here we will show some of the previous work, which will be briefly explained.

In 2010, Raouf et al. [5] describe the construction and analysis of a Multi-Modal Arabic Corpus (MMAC), which differs from other corpora it not only contains words but also contains parts of Arabic words or Pieces of Arabic Words (PAWs) as well as Naked Pieces of Arabic Words (NPAWs) and Naked Words (NWords); PAWs and Words without diacritical marks. The multiple data model was generated from the texts and the images in the documents. In addition to the images generated for Words, NWords, PAWs and NPAWs involved. The goal of designing the MMAC the corpus is to help traditional Arabic users in addition to helping, but at the same time to be beneficial to OCR applications developers.

In 2013, El-Haj and Koulali [6] built an Arabic multipurpose corpus, which we call KALIMAT1 (Arabic transliteration of "WORDS"). They carried out their work using Arabic NLP tools. The tools include auto-summarisers, Part of Speech Tagger, Morphological Analyser and Named Entity Recognition (NER). To obtain better results, they worked on developing, testing and improving Arabic NLP tools. They worked on providing KALIMAT1 for use by researchers in developing their Arabic NLP tools. Researchers can use the corpus as gold-standards and or baselines.

In 2013, McMillen [7], made study into the deliberative properties of social interaction in online comment threads. The sample for this study is online comment threads collected from three different online news sites (thehill.com, thenation.com, and thenationalreview.com). The study builds upon existing theoretical literature on public deliberation and applies it to the subject of online comments. It also employs a method of textual analysis to address a gap in empirical research of comments where comments are studied in relation to those around them rather than as separate units of analysis. The comments analyzed show evidence of informal conversational style and show three common themes of social interaction: tolerance for hostility, encouraging quality debate, and a value of information exchanges.

In 2018, Kim et al [8], developed what they call "controversy indicator" based on an analysis of readers 'comments on political news published on the Internet. They calculated a controversy score using the total number of reader comments and the proportion of "upvotes" (indicating approval) and "downvotes" (indicating disapproval) a given news article elicits. They compared a group of articles that attracted the largest share of reader comments with a group of articles characterized by strong disagreements between readers. The former is denoted the "high positive indicator" group and the latter the "high negative indicator" group. They found the potential usefulness of the controversy indicator in understanding the contemporary news environment, which is becoming increasingly divisive and polluted with disinformation.

3. Readers Interact with Articles through Comments

The commentary is used by providing an online response to the opportunity for readers to interact with each other or express their consent or disagreement with the content of the article or the comments of others. Through public comments, a dialogue is created among commentators so that the ideas are discussed and negotiated. In fact, comments cannot be considered to represent the views of all people, but because of the large number of comments that are available on certain articles, it can show the views of large citizens [9].

4. Concept of Corpus

Corpus is a set of naturally occurring language statements that are either written texts or a copy of recorded speech. It is a starting point for studying language or checking assumptions about the language. There are three main stages for building the corpus [10]:
- The preparatory step: In this step, the properties and the purpose of the corpus compilation are determined, and how the corpus is compiled. This is done before starting the corpus compilation process.
- The collection and the annotation of the corpus: For this step, the method used to construct the corpus is determined, which guarantees the fulfilment of the goals identified in the previous step.
- The use of the corpus: this step is about the statistical analysis and/or the linguistic analysis of the contents of the corpus. This step can bring some insights into the studied linguistic subject. For example, you can try to calculate the number of syntactic constructions by knowing the thematic context or the type of text (medical text, journalistic text, etc.).

5. The Concept of Natural Language Processing (NLP)

NLP is an interdisciplinary field that combines computational linguistics, computing science, cognitive science and artificial intelligence. From a scientific perspective, NLP aims to model the cognitive mechanisms underlying the understanding and production of human languages. From an engineering perspective, NLP is concerned with how to develop novel practical applications to facilitate the interactions between computers and human languages. There are several procedures of NLP that are used to work with raw text as the following [11]:
- **Tokenization and Stop Words: Tokenization** is the process of separating raw text data into several individual tokens, which are represented as a word or character. After we get a series of tokens, we then remove some tokens that cause noise affecting the process of extracting the properties because they are abundant in the language, which is called stop words. The concept of getting rid of stop words is usually called the concept of removing stop words
- **The Bag-of-Words Model (BoW):** It is one of the easiest procedures used to extract properties. The way this model works is to tokenization the raw text into tokens (words) then finding the count (frequency) for each token (word).

6. Statistical Method in Evaluation of Press Articles

The most famous methods of statistics are measures of central tendency or location. Location statistics give an indication of how big or how small the data set is. Arithmetic mean is the most popular and well known measure of central tendency. The mean is equal to the sum of all the values in the data set divided by the number of values in the data set, so the arithmetic mean (M) of observations $(x_{1 \ldots} \; x_n)$ as shown in Equation 1 [12]:

$$M = \frac{1}{n}(x_1 + x_2 + \cdots + x_n) = \frac{\sum_{i=1}^{n} xi}{n} \qquad (1)$$

Where (n) is the number of the elements.

7. Evaluation Technique of the Proposed System

To show the effectiveness and performance of the proposed system, it must be objectively evaluated. There are four measurements of evaluation: precision, recall, f-measure and accuracy by using Equations 2, 3, 4 and 5, which they have two types of corrects (TP and TN) and two types of errors (FP and FN) [13-15]
1. **True positive (TP):** it's the number of words that have been given the label (1) by the expert and system.

2. **True negative (TN):** it's the number of words that have been given the label (-1) by the expert and system.

3. **False positive (FP):** it's the number of words given by the system is (1) while the expert has given it (-1).

4. **False negative (FN):** it's the number of words given by the system is (-1) while the expert has given it (1).

$$\text{Precision (P)} = \frac{TP}{(TP+FP)} \qquad (2)$$

$$\text{Recall (R)} = \frac{TP}{(TP+FN)} \qquad (3)$$

$$\text{F-measure} = \frac{2*P*R}{P+R} \qquad (4)$$

$$\text{Accuracy} = \frac{(TP+TN)}{(TP+TN+FP+FN)} \qquad (5)$$

8. Evaluation Comments by the Experts

The questionnaire form is one of the most appropriate research tools that enable the widest possible access to information and data, allows saving time, effort and expenses, and achieving results that can be disseminated and invoked in the questionnaire through the form [16].

9. The Proposed System

The proposed system consists of two systems namely the Building Corpus and the Applying Statistical Technique stages. The aim of this system is to evaluate the journalist and his press articles based of characteristics of comments on press articles. The entire system components were established using C# programming language and SQL server. Programmatic dealing with Arabic texts as symbols does not take place directly because the programming languages are designed to deal with the English language. In this work, the problem of data entry was encountered, and to solve this problem, data was defined when it was stored in the database by type (nvarchar). A problem was also encountered in storing data in the database. To solve this problem, I used the programming instruction (Command. Parameters).

I. Building Corpus stage

The corpus stage is proposed to arrange a block of words to obtain clear indications towards the goal of analyzing comments. This stage is very important because the results of the proposed system depend entirely on it and through this system was determined the characteristics of words in terms of positive and negative. This stage was started by collecting comments (dataset) on several press articles used in the building of the corpus. The number of comments collected were about 200 comments that resulted from the readers' commentary on 12 press articles. The source of these press articles is the website of Al-Ahram newspaper from the political scene section during 2014 (Press articles and comments were obtained by contacting the editor of Al-Ahrarm newspaper and we asked him to provide us with newspaper articles and the comments on them (www.ahram.org.eg)). Dataset comments will be read once and entered into the proposed system, then all comments are divided into a series of words to get a list containing the words of all comments. Then comparing the list of Arabic stopwords with the list of words after that removing the similar words. The frequency is then calculated for each word in the list of words of comment, as shown in Table 1. These principles can be applied using an Algorithm. (1). In fact, Algorithm. (1) is the BOW algorithm, but a step for removing Arabic stopwords was added to the algorithm.

Algorithm. (1): The Bag-of-Words Model (BOW)
Inputs: SQLtable(comments), List of Arabic stopwords
Output: Frequency of Words

Begin
 Step 1 : Foreach word in Dataset
       Foreach word in list of Arabic stopwords
         If word = Arabic stopword then remove the word from list of words
          Find the frequency for each word in list of words
       Dictionary(word, frequency)= frequency of words
         Next
    Next
 End

Table 1: Samples of Words and their Frequencies

Word	Frequency	Word	Frequency	Word	Frequency
قتل	7	السرقة	1	الحميم	1
ذبح	1	اللصوصيه	٢	انصارهم	2
للقتل	1	اباحها	2	لانصارهم	1
بقتل	2	الحبيبه	2	انصارها	1
الحارات	1	بصديقه	2	الانصار	2
القتل	1	مناطق	1	رهط	٢
اغتيالهم	1	العزيز	4	بمنطقه	1
الاغتيالات	2	محبوب	3	منطقة	1

After obtained Table1. based on expert experience, the grouping process was applied to Table 1. The grouping process start by taking a word from Table 1 and comparing it with the remainder of the words. Each word that is similar in meaning will be taken as a member of the group. This group is called synonyms of the selected word. In order to deal with the origin of the word, it is necessary to use a stemming process. The stemming process was not used in the construction stage of the corpus because what matters in this work is the characteristic of the word only in terms of positive and positive, therefore the words that contain additions (Prefixes and/or the Suffixes) were considered as synonyms. Frequencies are also accumulated for the selected word and all words within the synonyms. This process is continued until Table 3 is obtained.

Table 2: Sample of word and its synonyms

Word	Synonyms	Frequency
قتل	الاغتيالات، اغتيالهم، القتل، بقتل، للقتل، ذبح	15
السرقة	اللصوصيه، النشالين	3
الحبيبه	الحميم، محبوب، العزيز، عزيزي، اصدقاءه، بصديقه، الود، ود	12
انصارهم	لانصارهم، انصارها، الانصار، رهط	8
منطقة	بمنطقه، مناطق، الحارات	4
اباحها		٢

After the completion of the clustering process, Table 3 contains some words with their synonyms that have a small frequency, so they must be normalized. This accomplished using the Algorithm. (2).

Algorithm. (2): Normalization process
Inputs: Corpus
Output: Improved corpus

Begin
Step 1: For each row in the corpus
If frequency < = threshold then delete row from the corpus
    End If
  Next
End

Alg. (2) checks the frequency of each row in Table 3. If the frequency is smaller or equal to the threshold, it will delete the row from Table 3.

Table 3: Sample of Normalization Process

Word	Synonyms	Frequency
قتل	الاغتيالات، اغتيالهم، القتل، بقتل، للقتل، ذبح	15
السرقة	اللصوصيه، النشالين	3
الحبيبه	الحميم، محبوب، العزيز، عزيزي، اصدقاءه، بصديقه، الود، ود	12
انصارهم	لانصارهم، انصارها، الانصار، رهط	8
منطقة	بمنطقه، مناطق، الحارات	4

Each word and its synonyms in Table 3 are processed by the expert, where it is based on expert opinion the positive word and its synonyms are given the label "1", while the negative word and its synonyms are given the label "-1". Neutral word and its synonyms are given the label "0". Then positive word and its group or negative word and its group are given weight within the range of 1 to 5 (this range was determined based on experience) where it is also based on expert opinion and based on the strength of the influence of the positive word, or one of its synonyms, and the negative word, or one of its attributes, on the evaluation of the article. The process of labelling and weighting is shown in Table 4.

Table 4: Weighting and Labelling Process

Word	Synonyms	Weight	Type
قتل	الاغتيالات، اغتيالهم، القتل، لقتل، بقتل، للقتل، ذبح	٤	-1
السرقة	اللصوصيه، النشالين	٢	-1
الحبيبه	الحميم، محبوب، العزيز، عزيزة، عزيزي، اصدقاءه، بصديقه، الود، ود	١	١
انصارهم	لانصارهم، انصارها، الانصار، رهط، أتباع	٣	١
منطقة	بمنطقه، مناطق، الحارات	0	٠

II. Applying Statistical Technique stage

The aim of this stage is to evaluate newspaper articles by statistical analysis of comments on newspaper articles. The evaluation is either negative (the article is not useful) or positive (the article is useful). After building the corpus by previous stage, the corpus will be entered to the next step that applies arithmetic mean technique, as in Algorithm. (3).

Algorithm. (3): Applying Statistical Technique
Input: SQLtable, c: Corpus, cm: Comments, st: List of Arabic stop words
Output: Evaluation of comments

Begin
Step 1 : Input database comments to be evaluated
        Foreach comment in set of comments
        Partition the comment into list of words then Remove Arabic stopwords
         from a list of comment words
Step 2: input the corpus (Table 4)
        Foreach record in the corpus
        generate list that contains word and its synonyms

Step 3 : Generate a lists of positive and negative words extracted from the comment

Step 4 : Find the frequency for positive words and negative words

Step 5 : Generate list of weights for positive words and list of weights for negative words by applying the equation

$$w_y = F * w_x$$

Step 6: Calculate arithmetic mean statistic for each list of weights.

$$M = \frac{1}{n}(x_1 + x_2 + \cdots + x_n) = \frac{\sum_{i=1}^{n} xi}{n}$$

Step 7 : Compare of statistical results between the list of weights of positive words and the list of weights of negative words

   Next

 Next

End

The procedures of the proposed system can be explained by applying Alg. (3) to find the arithmetic mean statistic in order to evaluate the comments that lead to evaluate the articles which can be clarified as in the following steps:

1. Partition the comment into a list of single words. Then removing Arabic stopwords. This is accomplished by comparing the list of Arabic stopwords with the list of comment words, then removing similar words from the list of comment words. The resulting list of word after removing the stop words will be used in step (3).

2. Read a row from Table 4 and represent it as a list containing the word and its synonyms. This step is repeated for each row from Table 4.

3. Generate the lists for positive and negative words that extract from the comment by comparing the resulting list from step (1) with the resulting list from step (2). If there is a similarity and the similar word is given label (1) in Table 4 then word is added to list of positive words. If there is a similarity and the similar word is given label (-1) in Table 4 then word is added to list of negative words.

4. Find the frequency for each word in the lists of positive and negative words using Alg. (1).

5. Generate the lists of positive and negative words weights by comparing the resulting each lists from step (٤) with the result list from step (2). If there is a similarity and the similar word is given label (1) in Table 4, then the weight is added to list of positive words. If there is a similarity and the similar word is given label (-1) in Table 4, then the weight is added to list of negative words. Then multiplying the frequency from step (4) by the lists of positive weights and negative weights by applying Equation 6.

$$Wy = F * W_x \qquad (6)$$

6. Calculate arithmetic mean statistic using Eq 1for each list of weights, in which the statistical result for positive and negative lists of weights are denoted by the symbol M1 and M2, respectively.

7. The evaluation of the comment is based on the comparison of M1 and M2 results and on the thresholds values that M1 and M2 including these thresholds. Thresholds are symbolized by th1, th2 and th3, respectively. The evaluation of the comment is as follows:

- In case the values M1 and M2 are within the th1. If M1> M2 then the evaluation of the comment is positive low elseif M2 > M1 then the evaluation of comment is negative low elseif M1= M2 then the evaluation of comment is normal.

- In case the values M1 and M2 are within the th2. If M1> M2 then the evaluation of the comment is positive medial elseif M2 > M1 then the evaluation of comment is negative medial elseif M1= M2 then the evaluation of comment is normal.

- In case the values M1 and M2 are within the th3. If M1> M2 then the evaluation of the comment is positive high elseif M2 > M1 then the evaluation of comment is negative high elseif M1= M2 then the evaluation of comment is normal.

10. Evaluation Comments by the Experts

Each expert was asked to extract positive and negative words and then give weight to each word. Then the expert was asked to take the plural of the weights of the positive words and the weights of the negative words and then compare the results of the plural to evaluate the comment. Ten copies of each comment were made from the comments database and distributed to experts. After completing the questionnaire, the average of the plural results was taken to weights of the positive and negative words.

11. Results and Discussion

I. Database

The used database consist of two tables. The first table consist ten press articles for "المشهد السياسي" literature. The second table consist of comments on press articles. It was used "one to many" relationship to connect the two tables. All of these press articles have a unique ID to distinguish them from each other and the comments take the ID based on ID of press articles. These press articles have been compiled from Al-Ahram newspaper from the "المشهد السياسي" literature and these press articles date back to the year ٢٠١٤.

II. The proposed System Results

1. Corpus Stage Results

Unlike other languages, the difficulty of the Arabic language is the lack of dealing with the Arabic language and the lack of corpus and corpus analysis tools, which led researchers to build their own corpus to suit their needs. The corpus was built to automated analysis of comments on press articles, which contain 429 clusters and 7300 single words.

2. The Automated Analysis of Press Articles

The press article is evaluated by collecting the comments of the press article as one comment and apply the proposed system on that collection of comments on the press article. If the result of the evaluation is "normal", "positive low", "positive medial" or "positive high". The press article is worth reading by readers, but if the result of the evaluation is "negative low", "negative medial" or "negative high", the press article is not worth reading. Table 5 shown the results of the evaluation each press article and Table 6 shown the range of three threshold that that specific how strong a negative or positive press article.

Table 5: The Result for Each Press Article

Press Article ID	Evaluation of Press Articles	M_1	M_2
A1	Normal	2	2
A2	Negative Medial	3	4
A3	Positive high	6	4
A4	Negative high	3	6
A5	Negative medial	3	5
A6	Positive low	2	1
A7	Positive medial	4	3
A8	Negative medial	3	4
A9	Negative medial	2	4
A10	Positive medial	4	2

It was noted in the Table 5, that the press articles A1, A3, A6, A7 and A10 were evaluated positively. Regardless of the strength of the positive characteristic, these articles were considered good and as a result readers were directed to these press articles. On the other hand, the press articles A2, A4, A5, A8 and A9 were evaluated negatively. Regardless of the strength of the negative characteristic, these articles were considered bad and as a result readers were directed not to read these press articles.

Table 6: Range Values of Thresholds

Threshold ID	Threshold Range	Evaluation of Press Article
TH1	>=2	"Positive low" or "Negative low"
TH2	3>= and <=5	"Positive Medial" or "Negative Medial"
TH3	<=6	"Positive High" or Negative High"

III. Evaluation Comments by Experts Results

In section (10), it is explained how the comments were evaluated by experts, which was done using a questionnaire form. The results shown in Table 7 for each sample comment. These comments are the same as those evaluated by the proposed system.

Table 7: The Results for Each Press Article

Press Article ID	Evaluation of Press Articles	M_1	M_2
A1	Positive low	2	1
A2	Negative high	2	7
A3	Positive high	4	٢
A4	Negative high	3	6
A5	Negative medial	3	4
A6	Positive low	2	1
A7	Positive medial	5	2
A8	Negative high	3	6
A9	Negative high	2	7
A10	Normal	2	2

IV. Evaluation of the Proposed System

The evaluation results using recall, precision, f-measure and accuracy of the proposed evaluation comments on press articles system were summarized in Table 8. This resulted from the comparison of the results of the automated evaluation and the results of the evaluation of experts.

Table 8: The Proposed System Evaluation Results

ID	Precision	Recall	F-measure	Accuracy	TP	TN	FP	FN
A1	1	0.85	0.92	0.88	28	7	0	5
A2	0.78	0.88	0.83	0.89	14	37	4	2
A3	1	1	1	1	25	17	0	0
A4	0.92	1	0.96	0.97	23	36	2	0
A5	0.91	0.93	0.92	0.90	50	29	5	4
A6	0.85	0.93	0.89	0.85	40	18	7	3
A7	1	0.91	0.95	0.91	21	14	0	2
A8	0.87	0.94	0.9	0.89	34	20	5	2
A9	0.83	0.95	0.89	0.91	20	28	4	1
A10	0.89	0.86	0.87	0.86	24	20	3	4

Table 8 illustrate precision, recall, f-measure and accuracy rustles for each press article. It's noted, that the evaluation of the A_1 by experts is "positive low" instead of "normal" by the proposed system. This resulted in the error ratio in the evaluation of the article as the results. So the error ratio was about (15%), (8%) and (١2%) for recall, f-measure and accuracy, respectively. Although the expert evaluation and the proposed system of the A_2 is negative, the difference is in the strength of the negative as the result of the evaluation of the proposed system is negative as observed in the Table 5 and the result of the expert evaluation is negative as observed in the Table 7. This resulted in an error ratio in the evaluation of the article as the results. So the error ratio was about (22%), (12%), (17%) and (10%) for precision, recall, f-measure and accuracy, respectively.
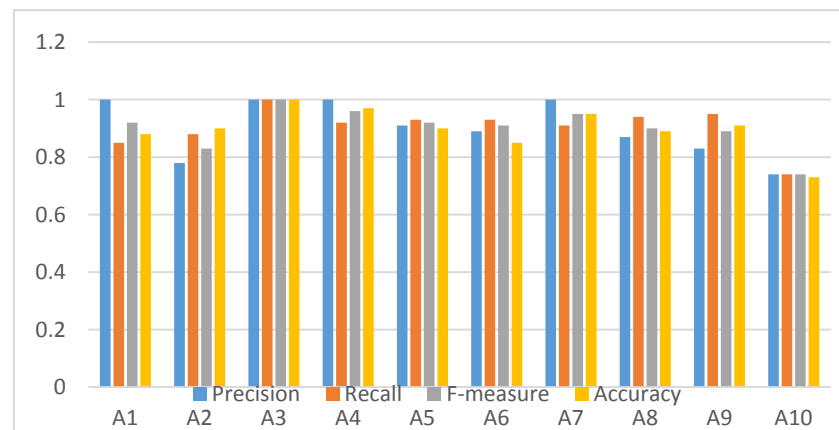
Figure 1: The Proposed System Results Evaluation Chart

V. Evaluation of the "المشهد السياسي" *literature*

In order to evaluate the "المشهد السياسي" literature, all comments were collected for all the database press articles of the "المشهد السياسي" literature as if they were one comment and then the proposed system applied to that one comment, as shown in Table 9 the evaluation of the writer is "negative", so this writer was considered bad and as a result readers were directed not to read the press articles for this writer.

Table 9: Evaluation of "المشهد السياسي" literature

Evaluation of Writer	M_1	M_2
Positive medial	5	3

As shown Table 9 the literature's assessment is positive medial and therefore it recommend directing readers to read the press articles that publishing in this literature.

The evaluation of the proposed system in evaluate the "المشهد السياسي" literature based on comments of press articles of it was shown in Table 10

Table 10: Proposed system in evaluate the "المشهد السياسي" literature

Precision	Recall	F-measure	Accuracy	TP	TN	FP	FN
0.94	0.94	0.94	0.93	٢٨٠	٢٥٠	١٨	١٩

As shown in Table 10 the evaluation results were excellent that was indicated the evaluation of the proposed system in evaluate the "المشهد السياسي" literature was convergent from the opinion of experts.

12. Conclusion and Future Works

This paper presents the implementation of the proposed system that was designed under the goal of using an automated scale to evaluate comments on press articles. Form the experimental results, some main conclusions are derived and presented in this section as follow:

• Its notes, that the performance of the proposed system on the comments database was very good and this indicates the extent of convergence between the performance of the proposed system and that of experts in evaluating comments. Thus, the proposed system is able to evaluate comments very efficiently.

• The performance of the proposed system in the evaluation of comments depends not only on the number of positive and negative words derived from the comment but also on the weight of words, where it is possible that the number of negative words is more than the number of positive words and the result of the evaluation of the comment is positive, because the weight of positive words is more and this indicates that the impact of positive words in the evaluation has more impact than negative words.

• The proposed system was applied to comments of different lengths and it was noted that the longer the comment the longer the performance of the proposed system which is more accurate in the evaluation and the reason is that it is possible to draw one positive word from the comment in the case of short comments and its strong impact on the comment .In the case of long comments, the more positive words appear, the less the impact.

• It was noted that corpus is not only limited to data collection but also has an active role in data analysis as it has been instrumental in analyzing comments and then categorizing them into positive and negative comments.

For future works, it would be interesting to use stemmer for Arabic language in order to deal only with the roots of words instead of wasting time compiling words that contain additions and are considered synonyms. The use of data mining techniques in the evaluation of comments on press articles and using additional statistical techniques and comparing their results would be important. We tried to introduce the proposed system in a simple way and in order to develop it, more advanced techniques can be used to evaluate comments such as data mining techniques.

References

[1] L. Mathe, and M. Caldwell, "A content analysis of readers' comments on political and economic news articles from zimbabwe online media," Communication, Vol. 8, No. 1, pp. 56-68, 2017.

[2] N. Diakopoulos, and M. Naaman, "Towards quality discourse in online news comments," The 2nd int. Conference On Building Construction And Environment-BCEE2, China, 2015.

[3] F. S Faiaz, and H. K Milh, "News trends in the 2010 Iraq Council of Representatives elections in the electronic press," (available in Arabic) Adab al-Farahidi, No. ٢٤, pp. 133-142, 2016.

[4] K.H Hasan, "Patterns of use of electronic newspapers by the Iraqi public," (available in Arabic) Medad Arts, Vol. 1, No. 16, pp. 759-784, 2019.

[5] A. AbdelRaouf, C. A. Higgins, T. Pridmore, and M. Khalil, "Building a multi- modal Arabic corpus (MMAC)," Document Analysis and Recognition, Vol. 13, No. 4, pp. 285-302, 2010.

[6] M. El-Haj, and R. Koulali, "Kalimat a Multipurpose Arabic Corpus," Second workshop on Arabic corpus linguistics (WACL-2), 22-25, 2013.

[7] S. R. McMillen, "Threads of deliberation: a textual analysis of online news comments," MSc. Thesis, Scripps College of Communication, Univ. of Ohio, 2013.

[8] C. W. Kim, H. Park, Y. Lee, and H. W. Park, "Towards the operationalization of controversial news: a study of online news articles and reader comments during the 2017 presidential election in south Korea," Cement, concrete, and aggregates, Vol. 53, No. 3, pp. 1097-1108, 2018.

[9] N. Henrich, and B. Holmes, "Web news readers' comments: towards developing a ethodology for using on-line comments in social inquiry," Media and Communication Studies, Vol. 5, No. 1, pp. 1-4, 2013.

[10] M. Z. Kurdi, "Natural language processing and computational linguistics," John & Sons, UK and USA, 2016.

[11] L. Deng, and Y. Liu, "Deep Learning in natural language processing," Springer, USA and China, 2018.

[12] P. Goos, and D. Meintrup, "Statistics with JMP: graphs, descriptive statistics, and probability," John Wiley & Sons, India, 2015.

[13] K. Shaalan, A. Hassanien, and F. Tolba, "Intelligent natural language processing: trends and applications," Springer, United Arab Emirates and Egypt, 2018.

[14] D. S. Al-Azzawy, and F. M. Al-Rufaye, "Arabic words clustering by using K- means algorithm," Annual Conference on New Trends in Information & Communications Technology Applications (NTICT), IEEE, 2017.

[15] J. Eisenstein, "Natural language processing," Cambridge, MA: The MIT Press, 2018.

[16] K. Soania, "Attitudes of the student audience towards electronic journalism a field study on a sample of university students using the Internet" (available in Arabic) M.Sc. Thesis, Humanities Dept., Univ. of Muhammd Kider, Algeria, 2011.