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EDITORIAL

A Foreword from the Editor-in-Chief

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Over the past decades, Internet has gone beyond information sharing and communication, and become a platform for service reuse and service integration. Computing reuse based on abstraction and divide-and-conquer is at core of computer science and IT industry over the past decades, and the computing reuse granularity has grown from functions/methods to objects, reusable software components, and distributed cloud services. The maturity of container and microservice technologies makes both software system development and deployment truly distributed and reusable. The advancement in speed and security has now also enabled Internet to become an enterprise service integration platform that promote service reuse and management to an even higher level. "Internet +" is one of the layman's terms to emphasize the new prominent function of Internet in local / regional / national / international scope enterprise service integration and reuse.

The second most distinguished feature of today's computing industry is the development and important role of intelligent systems. AI and machine learning, in particular Deep Learning, is transforming many technological and

business processes to optimize system performance. But machine learning works mainly by extracting experience from big data. While it can optimize system performance in various application domains, we cannot explain why a particular set of parameter values lead to good system performance, and slight environment change may make the optimized system useless. The future intelligent systems must be based on knowledge empowered systems. While ontology based OWL (Web Ontology Language) is the current industry standard for knowledge representation, we have proven that OWL need be extended to knowledge graphs by supporting domain-specific relations to empower true intelligent systems.

This issue includes three articles related to the themes above: the evaluation of an innovative network protocol for Internet-scoped system integration, a case-study of implementing Internet-based system integration in a sample industry, and how to let computer identify relations among entities in natural language and measure similarity among natural language sentences. We hope they will lead to more paper contributions in these and similar important computing research areas.

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ARTICLE

Evaluating Word Similarity Measure of Embeddings Through Binary Classification

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ABSTRACT

We consider the following problem: given neural language models (embeddings) each of which is trained on an unknown data set, how can we determine which model would provide a better result when used for feature representation in a downstream task such as text classification or entity recognition? In this paper, we assess the word similarity measure through analyzing its impact on word embeddings learned from various datasets and how they perform in a simple classification task. Word representations were learned and assessed under the same conditions. For training word vectors, we used the implementation of Continuous Bag of Words described in [1]. To assess the quality of the vectors, we applied the analogy questions test for word similarity described in the same paper. Further, to measure the retrieval rate of an embedding model, we introduced a new metric (*Average Retrieval Error*) which measures the percentage of missing words in the model. We observe that scoring a high accuracy of syntactic and semantic similarities between word pairs is not an indicator of better classification results. This observation can be justified by the fact that a domain-specific corpus contributes to the performance better than a general-purpose corpus. For reproducibility, we release our experiments scripts and results.**

1. Introduction

Language modeling is the crux of the problem in Natural Language Processing (NLP). Recently, neural language models have outperformed the traditional language model approaches such as n -gram. The superiority of the neural methods lies in their capability to overcome the curse of the dimensionality problem while, simultaneously, capturing different similarities between words [2].

Neural language models learn distributed representations for each word in the form of real-numbers-val-

ue vectors, which allow similar words to have similar vectors. Such sharing is an important characteristic that enables the model to treat related words similarly and, hence, gives the model the ability to generalize. These word representations are usually known simply as *Word Embeddings*.

Nowadays, word embedding is the standard approach for feature representation in many NLP tasks. Traditional feature representation methods, such as bag-of-words and Term Frequency Inverse Document Frequency (TFIDF), rely on hand-crafted feature extractor and are time-consuming and domain-specific. Hence, embedding based

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** <https://github.com/iamaziz/embed-eval>

techniques provide a better alternative for automating many tasks in language modeling and NLP.

Among these techniques context-predicting semantic vectors have distinctly proven their superiority to the count-based ones^[3]. While count-based vectors are more about the frequency of the word, context-based vectors make more emphasis on the word and its context.

Popular word vector learning methods are introduced in^[1,4,5] and have gained great attention since then. From these methods, learning continuous word embeddings using skip-gram and negative sampling is the most common approach for building word vectors^[6]. This method was introduced and described in^[1].

However, since vector training occurs in an unsupervised fashion, there is no accurate way to estimate the quality of the vector representations objectively. Several extrinsic and intrinsic evaluation methods have been discussed in^[7]. However, at the time of this writing, there is still no reliable method for comparing the quality of different embedding models. So, this is still an open question. Commonly, the quality can be assessed using the word similarity task, which is a test with a set of similarity analogy questions^[1].

Nevertheless, with the current word similarity evaluation method, word similarity accuracy and having more vocabulary in the model do not result in better performance in the downstream task.

From experiments, we show that scoring well on word similarity measure questions does not imply better performance in the downstream task. Our findings are in line with the observations of^[8]. Therefore, we observe that the accuracy of word similarity measure is not, necessarily, an indicator for the usefulness of the word embedding model. In this paper, we explain and justify this claim based on the observation of our experimentation results.

For instance, we show that the GoogleNews embedding model has the following two advantages over the IMDB model. First, it scores better results in word similarity accuracy (74.26%) in comparison to IMDB's (23.71%); second, GoogleNews contains 3 million vocabulary words while IMDB contains around 19,000. Despite these advantages of GoogleNews, the classifiers' performance was worse with GoogleNews than with IMDB.

The rest of the paper is structured into the following parts: related work, our experiments, discussion, future work, and finally, the conclusion.

2. Related Work

We approached related work in the following manner: first, we investigated what it takes to build quality embedding models and which components to consider.

We then analyzed similar work for evaluating word embeddings using extrinsic and intrinsic methods. We also reviewed the available current work on building domain-specific embeddings. And finally, we look into work that focuses on the syntactic and semantic similarities between words.

Training elements such as the model, the corpus, and the parameters have been analyzed in detail in^[9]. They observed that the corpus domain is more important than its size. This explains our results where the smaller domain-specific corpus (IMDB) achieved better results than the much larger general-purpose corpus (Google-News).

We reviewed papers on evaluating word vectors' quality and model accuracies. Existing evaluation methods fall into two types: intrinsic and extrinsic evaluation. In the intrinsic evaluation, the goal is to directly assess the quality of word vectors in hopes that it will reflect on the performance of the downstream tasks. So, synthetic metrics are proposed to test the semantic and syntactic similarities between words.

For example, a pre-selected set of query terms is used to estimate words' relationships. Each query denotes two pairs of "analogically" similar words. For example, relating *big* to *bigger* in the same way as *small* to *smaller* is called "syntactic similarity", while relating *Tokyo* to *Japan* in the same way as *London* to *England* is called "semantic similarity". Then, such queries can take the form of questions, for instance, "What is the word similar to *small* in the same sense as *bigger* is similar to *big*?" To query the model, a question is formulated in an algebraic expression as follows: $answer = vector("bigger") - vector("big") + vector("small")$. This method was first proposed in^[1]; and published with a set of around 20 thousand syntactic/semantic questions. It is fast and computationally inexpensive, however, there are problems associated with this technique^[8]. Further, other evaluation techniques have been proposed to reduce bias^[10]. In such methods, they directly compare embeddings with respect to specific queries.

While in the extrinsic evaluation, we indirectly evaluate word embeddings. In other words, we use the embeddings as input features to a downstream task and measure the performance metrics specified to that task^[10]. For instance, when the task is text classification, we would use the embeddings to represent words in the text. In some approaches, they applied extrinsic evaluations to learn task-specific embeddings^[11].

Finally, a thorough investigation and survey covering the current evaluation methods have been discussed in^[7].

3. Building Word Embeddings

3.1 Data Collection and Exploration

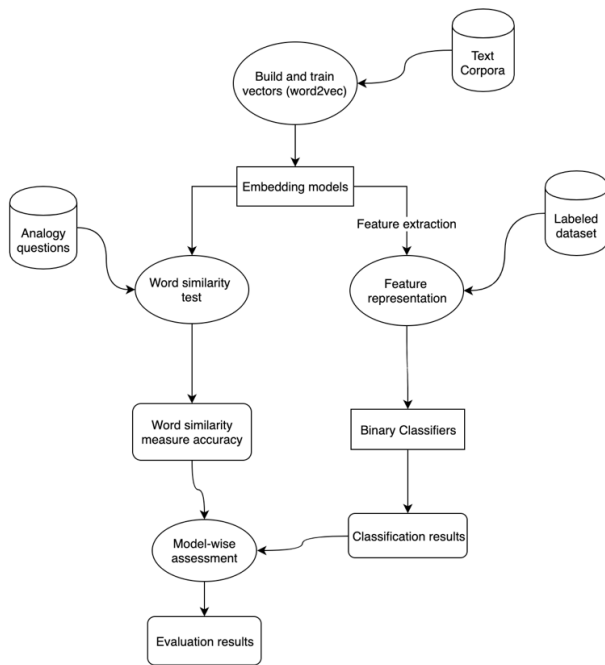


Figure 1. The approach design and workflow

In this section, we describe the data sources and texts we used for training the embedding models. We started with two well-known corpora. The first one is *text8*, a standard corpus used in NLP community which has around 100MB of cleaned English text of a Wikipedia dump from 2006, and the second one is the Large Movie Review Dataset (or IMDB). IMDB contains 100 thousand movie reviews prepared for sentiment classification problems. Later on, we will use this same dataset in our classification experiment; we are aware this may cause bias in the datasets, further discussion to follow later.

As a way to augment our data, we created a new hybrid corpus by concatenating the above two corpora; we call it *text8-imdb*. This allows us to compare the results of two models and their hybrid to see how they may affect one another. Later on, in the classification section, we will see that *imdb* achieved the best among the three. This is a bit surprising, because its *average retrieval error* (1.46) was higher than that of *text8-imdb* (0.99); though it still achieved better results.

For additional insights about the data, we explored each corpus for statistical information “meta-data” such as number of the unique words, the total count of characters, and the total count of words. See Table 1 for more details on these metrics.

Table 1. Statistics of the training text (corpus)

Corpus	char count	word count	unique words
imdb	125,882,839	23,573,192	144,841
text8	100,000,000	17,005,207	253,854

We also wanted to get a better sense of the characters’ usage and their frequency in each corpus. Figure 2 illustrates some visualization of the usages. It shows the frequency of the 26 English letters usage in each of the three corpora.

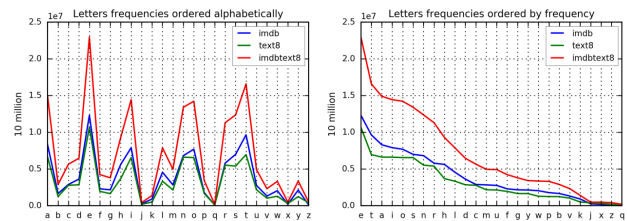


Figure 2. Letters frequencies as they appear in *text8* and IMDB

3.2 Model Training and Parameters

Following ^[1] approach for learning vector representations of words, we trained three models using three various corpora. In the first one, we merged the entire set of 100,000 movie reviews ^[12] into one big text file, we will refer to the vectors “model” generated from this text as *imdb*. And for the second model, as mentioned in the previous section, we used a 100 MB of cleaned Wikipedia English text known as *text8*, we will call the model from this corpus: *text8*. The third “hybrid” model is the combination of the two above files (as one big text file). We refer to this model as *imdb-text8*. The fourth model, in our experiment, is GoogleNews. A pre-trained model published in ^[1].

With the exception of GoogleNews, all the models were trained using CBOW architecture with the same hyper-parameters. We used the original (C language) implementation of word2vec toolkit. After compiling and building the software locally, we use the following command to train the models:

```

$ ./word2vec -train $CORPUS \
  -output $OUT \
  -cbow 1 \
  -size 300 \
  -window 10 \
  -negative 25 \
  -hs 0 \
  -sample 1e-4 \
  -threads 20 \

```

-binary 1 \\
-iter 15

3.3 Exploring Models

After we built the models, we decided to evaluate their response to the analogy question test sets. Table 2 below displays the number of the learned “vectorized” vocabulary in each model. The table also shows the number of questions seen in the model, along with their average similarity accuracy. These results were obtained based on \$./word2vec/compute-accuracy script in the same toolkit. For faster approximate evaluation, we used the recommended threshold of 30,000 to reduce vocabulary.

Table 2. Embedding vectors compared

Embeddings	# vocab.	dim.	# quest. seen	avg. sim. acc.
imdb	53,195	300	10,505	33.41%
text8	71,291	300	12,268	53.60%
imdb-text8	94,158	300	12,448	59.89%
GoogleNews	3M	300	13,190	76.85%

3.4 Determining Models Accuracy

To conduct a fair comparison between models, we introduce the *Average Retrieval Error* “AVG_ERR” as a way to estimate the vectors’ availability in the given model. It is the total number of *missed words* (i.e. words that queried but not available in the embedding model) over the *total words* queried. See formula 1 below:

$$\frac{\sum_{i=1}^n Q(t_i - r_i)}{n}$$

Where, Q is a query to the model which returns the vectors for a set of given tokens (words), is the total number of the queries made, t is the number of tokens in query i , and r is the number of retrieved (found) vectors for query i .

For simplicity, we can rewrite as:

$$\text{Avg. Retrieval Error} = \frac{\sum_{i=1}^n m_i}{n}$$

And m is the number of missed (not found) vectors for query i .

In Figure 3, we show the number and percentage of analogy questions seen in the model (with a threshold of 30K) for word similarity task.

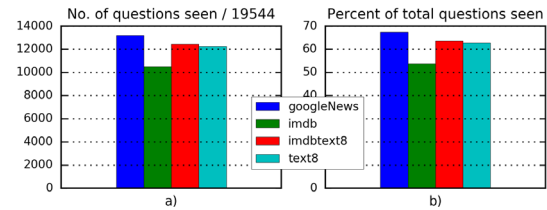


Figure 3. Embeddings results on the word analogy task (out of the total 19544 questions), figure a. is the number of questions seen and figure b. is the percentage of the questions seen

We also recorded the accuracy for each topic of the 14 question type categories. Instead of using a huge table with many numbers, we decided to illustrate the result in figure 4 to quickly grasp the topics’ results.

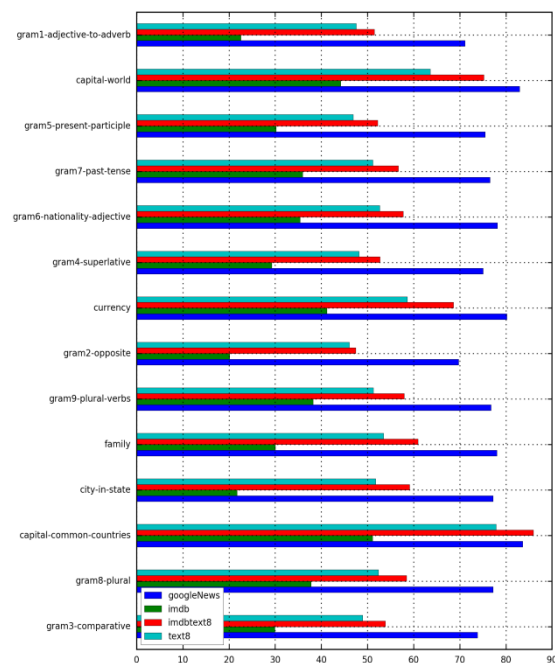


Figure 4. Results on the topics accuracy from word analogy task

Finally, in figure 5, we show the overall accuracy results for every model; such as the average score for all topics and density of topics’ results.

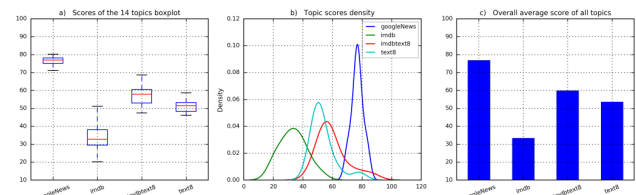


Figure 5. Accumulative results (14 topics) on the word analogy task for each embeddings. a) boxplot for the range of topics’ result b) the density of topics’ scores, and c) the average score of all topics

Despite the scored word similarity accuracy of the IMDB model, its classification result is quite impressive. We will see that in the next section; where the learned word representations reflect a great deal of the actual semantics.

4. Applying Embedding Models for Binary Classification

In this section we evaluate the performance of each embedding model in a downstream task. Our task is a simple binary classification for sentiment analysis problem.

4.1 Supervised Training Dataset

To train the sentiment classifiers, we used the popular benchmark IMDB-50K movie reviews dataset. It was introduced by [12], and available to download. The dataset, which was prepared specially for binary sentiment classification, contains 25K highly polar movie reviews for training and 25K for testing. The sentiment of reviews is balanced in both data sets, i.e. one half is positive, and the other half is negative.

Additionally, IMDB has another unlabeled dataset contains 50K reviews which we used in training our word2vec models. This dataset, however, was not used for training the binary classifiers.

4.2 Representing Reviews

After preprocessing the review text, the vector representation of each token “word” is then retrieved by querying the embedding model. If a token is not found in the embeddings’ vocabulary, its representation will be ignored. That’s where the concept of *Average Retrieval Error* comes from. The more tokens missed, the higher the average error will be. When all the review’s tokens are processed, the review then will be represented as a fixed size feature vector by averaging the representations of all tokens.

4.3 Training Classifiers Results

We trained five simple binary classification algorithms Perceptron, Support Vector Machines, Stochastic Gradient Descent, Logistic Regression, and Random Forest. We used the built-in implementations of these algorithms provided by the scientific toolkit library “scikit-learn”. As for parameters tuning, we applied the default parameters in scikit-learn.

To know the complete set of parameters for each classifier, one can refer to the log file we included with our project code.

In table 3, we show the performance of each classifier with each of the respective four embedding models.

Table 3. Vocabulary Size, Average Retrieval Errors, and Classifiers Performance with each model

Model	Vocab.	AVG_ERR	Percept.	SVM	SGD	LogReg	RForest
imdb	53,195	1.46	84.29%	89.20%	86.49%	89.19%	84.39%
text8	71,291	4.62	76.62%	81.17%	75.44%	81.22%	73.88%
imdb-text8	94,158	0.99	80.11%	89.12%	85.50%	89.08%	83.96%
Google-News	3,000,000	28.04	78.94%	86.14%	82.89%	86.08%	80.16%

See figure 6 for a better visual comparison of the scores. We can see that the classifiers scored better with IMDB embedding model, despite that GoogleNews model has better accuracy in term of analogy query test. We can also notice that IMDB is still better than its hybrid model text8-imdb which intuitively should enrich the model’s representation capacity by adding more vocabulary (which can be verified by inspected the average retrieval error decrease from imdb to text8-imdb). Reducing AVG_ERR did not improve the classifiers; but on the contrary, combining text8 degrades imdb’s performance.

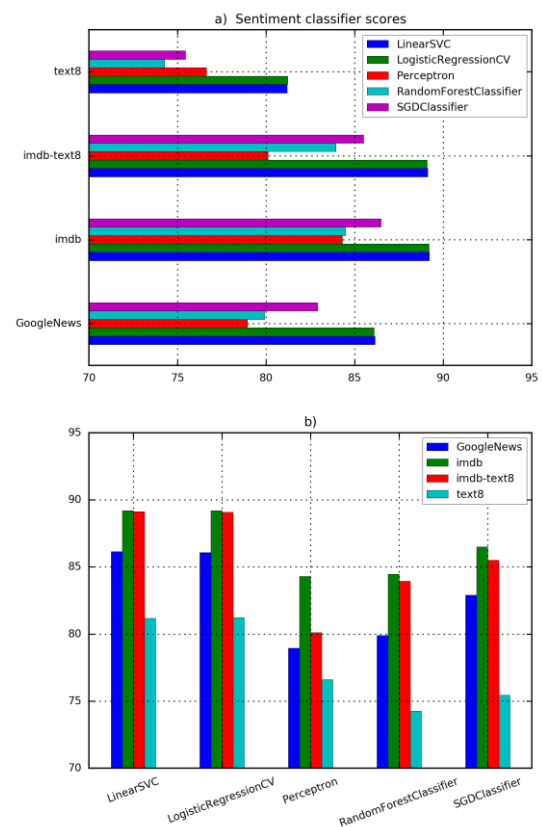


Figure 6. Sentiment classifiers score with each embeddings. a) embedding models wise results, and b) classifiers wise results.

Avoiding bias in IMDB

The training and testing datasets are initially the same corpus that we use to generate imdb embeddings. Thus, and to make sure that our testing is not biased, we used another sentiment dataset (i.e. other than IMDB reviews) to test the performance of the classifier. The dataset contains 7086 labeled (positive/negative) training sentences and 33052 unlabeled sentences provided for prediction problems. We used the training data for testing our classifiers, as we were not able to acquire the actual labels of prediction set. As expected, the highest scores of the classifiers still achieved with imdb embeddings.

5. Discussion: Results summary

To summarize and aggregate all the results and scores together in one place. We took the average score of all classifiers achieved with each embedding model. These aggregates are displayed in table 4.

Table 4. Summary on the final results for embedding models' accuracy and classification performance

Embeddings	vocab. size	AVG. retrieval err.	AVG. similarity acc.	AVG. sentiment score
imdb	53,195	1.46	33.41%	86.73%
text8	71,291	4.62	53.60%	77.74%
imdb-text8	94,158	0.99	59.89%	85.55%
GoogleNews	3M	28.04	76.85%	82.79%

5.1 Model Accuracy and Classifiers Performance

Why IMDB word embedding model is better than GoogleNews embedding? Learning task-specific vectors through fine-tuning offers further gain in performance. See static vs. non-static representation (section 4.2 of CNN sentence classification^[13]).

So, for example, you'd expect words like "amazing" and "awful" to be very far apart whereas in word2vec they'd probably be closer because they can appear in similar contexts.

In the accuracy evaluation, IMDB model scored 22.94% on the 8182 test cases found (out of the 19544 test cases); while the GoogleNews model scored 74.26% on the 7614 test cases found. Although IMDB model scored less, the sentiment classifiers performed better with it in comparison to the other model.

5.2 Improving Classifiers' Performance

Although we were not concerned with improving the overall performance of the classifiers, there are several things to consider that can improve the classifiers' results.

For example, one can apply the ensemble approach, described in^[14], that combine multiple baseline models rather than relying on a single model. Further improvement might be introduced by describing the review feature differently, instead of averaging the vectors^[15].

Also, while training the vectors, careful choice and tuning of the hyper-parameters could bring much gain to the model accuracy^[16]. Finally, one may consider words dependency instead of relying solely on linear contexts^[17].

5.3 Missing Data

When a given token (of a sentence) is not available in the embedding model, its vector value is ignored. However, it is counted toward the sentence length when we take the overall average. Can we do something else about this? e.g. 1) substitute (compute) its value as the average of other tokens in the same review, or 2) do not count it in review length, or 3) apply other known techniques for handling NaN values.

5.5 Average Retrieval Error

After comparing the models' sensitivity to the average retrieval error, we noticed that word retrieval in a model does not affect the overall performance. Possibly, one way to enrich this metric is by introducing word-wise weights. For example, common words can have low weight while the less common ones can have higher weight.

5.6 Extending This Work

We can think of three possible ways to further extend this work. Firstly, expand the models range for broader comparison. For instance, one can integrate more (other) pre-trained models such as GloVe, ELMo, BERT to use in both experiments; embedding quality assessment, and binary classifiers. Secondly, and to enrich the procedure of classification comparison, one can try another approach to aggregating the sentence features (other than averaging vectors for sentence representations). Finally, in this work, we introduced the *Average Retrieval Error* "AVG_ERR". We think this measure can be further improved by adding weights to words in the sentences. For example, stop words, and common vocabulary can have less weight than those that are more specific.

6. Conclusion

We discussed the problem of choosing between multiple word embedding models. To this end, we made the following contributions. We built and trained three different embeddings models based on published data sets. We, then, implemented two types of evaluation methods on the

models. For the intrinsic evaluation, we applied the word similarity measure method; while we did the extrinsic evaluations through a binary classification problem. We presented the results of performance comparisons over four different embedding models. We also introduced a metric for measuring the model's retrieval rate to the number of queries made. For reproducibility, we released the models, data, and scripts used in our experiments.

We have shown that scoring high accuracy in the Word Similarity Measure test does not imply better performance in the downstream task. In other words, if a model A achieves a higher score than model B in the analogy question test, this does not mean A will perform better than B in a downstream task. This finding is in line with observations from related work. We also observed that the model's coverage of vocabulary (i.e. vocabulary size) is not as essential as containing a domain-specific dictionary.

References

- [1] Tomas Mikolov, Kai Chen, Greg Corrado, and Jeffrey Dean. Efficient estimation of word representations in vector space. arXiv.org, 2013.
- [2] Goodfellow, Yoshua Bengio, and Aaron Courville. Deep Learning. MIT Press, 2016. <http://www.deeplearningbook.org>
- [3] Marco Baroni, Georgiana Dinu, and Germ'an Kruszewski. Don't count, predict! a systematic comparison of context-counting vs. contextpredicting semantic vectors. In ACL, 2014, (1): 238–247.
- [4] Jeffrey Pennington, Richard Socher, and Christopher D Manning. Glove: Global vectors for word representation. EMNLP, 2014: 1532–1543.
- [5] Christopher D Manning. Computational linguistics and deep learning. COLING, 2015, 41(4): 701–707.
- [6] Wang Ling, Chris Dyer, Alan W Black, and Isabel Trancoso. Two/too simple adaptations of word2vec for syntax problems. In Proceedings of the 2015 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, 2015: 1299–1304.
- [7] Amir Bakarov. A survey of word embeddings evaluation methods. arXiv preprint arXiv:1801.09536, 2018.
- [8] Manaal Faruqui, Yulia Tsvetkov, Pushpendre Ras-togi, and Chris Dyer. Problems with evaluation of word embeddings using word similarity tasks. arXiv preprint arXiv:1605.02276, 2016.
- [9] Siwei Lai, Kang Liu, Shizhu He, and Jun Zhao. How to generate a good word embedding. IEEE Intelligent Systems, 2016, 31(6): 5–14.
- [10] Tobias Schnabel, Igor Labutov, David Mimno, and Thorsten Joachims. Evaluation methods for unsupervised word embeddings. In Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing, 2015: 298–307.
- [11] Duyu Tang, Furu Wei, Nan Yang, Ming Zhou, Ting Liu, and Bing Qin. Learning sentiment-specific word embedding for twitter sentiment classification. In Proceedings of the 52nd Annual Meeting of the Association for Computational Linguistics, 2014, 1: Long Papers: 1555–1565.
- [12] Andrew L Maas, Raymond E Daly, Peter T Pham, Dan Huang, Andrew Y Ng, and Christopher Potts. Learning word vectors for sentiment analysis. In Proceedings of the 49th annual meeting of the association for computational linguistics: Human language technologies. Association for Computational Linguistics, 2011, 1: 142–150.
- [13] Yoon Kim. Convolutional neural networks for sentence classification. arXiv preprint arXiv:1408.5882, 2014.
- [14] Gr'egoire Mesnil, Tomas Mikolov, Marc'Aurelio Ranzato, and Yoshua Bengio. Ensemble of generative and discriminative techniques for sentiment analysis of movie reviews. AAAI Spring Symposium AI Technologies for Homeland Security 200591–98, cs.CL, 2014.
- [15] R'emi Lebrete and Ronan Collobert. The sum of its parts: Joint learning of word and phrase representations with autoencoders. arXiv preprint arXiv:1506.05703, 2015.
- [16] Omer Levy, Yoav Goldberg, and Ido Dagan. Improving distributional similarity with lessons learned from word embeddings. Transactions of the Association for Computational Linguistics, 2015, 3(0): 211–225.
- [17] Edward Grefenstette, Phil Blunsom, Nando de Freitas, and Karl Moritz Hermann. A deep architecture for semantic parsing. arXiv preprint arXiv:1404.7296, 2014.

ARTICLE

Discussion on Innovation of Seasoning under the Background of “Internet +”

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ABSTRACT

“Internet +” has become the mainstream trend of development in the new era, and the degree of integration with various industries is deepening. Under the background of “Internet +”, traditional condiment enterprises are also facing a series of new demands for reform. Based on this, this paper, based on the reality of “Internet +” background, analyzes the existing problems in the development of condiments, and explores innovative strategies of condiments under the background of “Internet +”.

1. Introduction

“Internet +” is as the Internet information technology a new model, which is formed by the continuous improvement through the application of all kinds of Internet information technology and marketing, for the industry development speed and efficiency of ascension, represents a new social form, is also a showcase of social resources optimization allocation in the new period. Under the background of “Internet plus”, consumers' consumption preferences, purchase methods and purchase channels have changed accordingly. For condiment enterprises, the popularization of Internet information technology has brought more attention to online channels and made logistics delivery more convenient. Therefore, the sales of takeaway and semi-finished food usher in a new development opportunity. At the same time, customers have a wider choice of channels, and accordingly, put

forward higher requirements on the taste, source, health and freshness of food. Therefore, the condiment industry needs to closely grasp the development characteristics of “Internet +” background and explore innovative strategies of the condiment industry in the new era.

1.1 Sales are Still too Dependent on Traditional Channels

Compared with other products, seasoning products themselves belong to the category of daily necessities, so there is no obvious periodicity. However, under the new background of “Internet +”, single and traditional sales channels are far from meeting the development needs of the new period, and will also compress the development space of seasoning enterprises. According to the relevant data of China condiment industry association, the total production of condiments keeps growing year by year, but its sales revenue through Internet channels accounts for less than

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2%, which is obviously in conflict with the development trend of “Internet +” industry. Traditional sales channels mainly include supermarket and retail channels, wholesale channels, catering channels, etc., which are still the mainstream of condiment sales in the new era. However, these channels themselves also have the development characteristics of reform.

1.2 Serious Homogenization of Products

Condiments, as a kind of daily product, are developed in accordance with traditional production technology, brewing technology and workshop style. Even for some enterprises with large scale, “small-scale peasant” operation mode is still relatively active. This also makes most condiment enterprises have the phenomenon of outdated equipment upgrading and high product homogeneity, which also makes their competition with similar products rely on price advantage, which will inevitably hinder the modernization process of condiment enterprises in the new era. With the expanding of “Internet +” background influence, the society for personalized, differentiated products put forward higher request, has its own characteristics of products is also easier to grab the internal demand in the new period, it underlines the hysteresis phenomenon of product homogeneity, and the phenomenon of change must rely on enterprise comprehensive innovation in the production of products.

1.3 The Quality is Uneven, and the Promotion Method is Obsolete

Condiments are closely related to the daily life of the public, and the quality problem of condiments can easily be transformed into a certain social problem. Taken together, the concentration degree of the condiment industry is still in a low level, condiment enterprises has the characteristics of regional, scale, standardization degree is not high, so easily in condiments raw materials procurement, storage, production monitoring, oversight save tedious links such as production, thus makes the condiment market presents the situation of good and evil people mixed up, the good and bad are intermingled, which limits the seasoning the modernization development of the enterprise. At the same time, it is because of condiment enterprises do not have a high level of centralization of itself, its promotion way presents obvious lag, some companies still rely too much on traditional way of media, although the more promotion cost, it is difficult to get breakthrough to promote the efficiency, this requires a condiment enterprises must grasp the development trend of the Internet era, actively explore diversified media channels of promo-

tion strategy.

2. Innovative Strategies of Seasoning under the Background of “Internet +”

2.1 Product Innovation

2.1.1 Packaging Innovation

Packaging innovation is mainly aimed at the visibility, convenience and functionality of traditional condiment packaging, so as to provide better experience for consumers under the background of “Internet +”. In the new era, consumers pay more attention to the basic quality of food. Therefore, if semi-finished products and finished products are packaged in a relatively transparent way to expand the visible space of consumers, consumers can feel the freshness of food materials more truly, so as to attract more targeted consumption. Convenience innovation focuses on reducing the inconvenience in the process of consumer purchase and use, which can be realized by simplifying the way of opening, providing disposable gloves and other forms, reflecting the beauty of modern seasoning details. Functionality can provide small amount and self-matching packaging. For example, traditional whole flavoring can be divided into single small amount through split packaging, which is convenient for consumers to use and can also effectively increase the taste of flavoring. To sum up, under the background of “Internet +”, the packaging innovation of condiments needs to continue to develop towards personalization, humanization and convenience.

2.1.2 Taste Innovation

Taste is the core standard for consumers to evaluate the quality of condiments, and it is also the concentrated display of the functionality of condiments. Under the background of “Internet +”, differentiation has become an important magic weapon for the marketing and development of enterprises. Therefore, seasoning enterprises should also actively explore the differentiation and innovation of product taste. On the basis of existing product categories, enterprises should strengthen technical input, explore the integration of Chinese and western flavors and the innovation of regional flavors, and develop diversified condiments. At the same time, it should also provide a wide range of choices from single flavor to multi-flavor packaging according to the differentiated needs of consumer groups.

2.1.3 Customization Innovation

First, play the linkage role of the third-party takeaway

platform to launch customized products. At present, the takeaway platform based on “Internet +” is more closely connected with the daily life of the public. In the process of customized innovation, seasoning enterprises should strengthen the advantages of the third-party takeaway platform and make use of its huge traffic and convenient logistics system to create corresponding customized products. For example, we can create customized seasoning packages with ele. me, Meituan and other mainstream takeaway platforms.

Second, with the industry's high-quality catering enterprises to carry out joint customization. There is a very close relationship between catering enterprises and flavoring enterprises. The flavoring enterprises should strengthen the industry investigation, cooperate with the high-quality catering enterprises in the industry, and launch joint customized flavoring. Moreover, with the modernization of cold chain technology, freshness of condiments can be effectively guaranteed, which also makes this kind of joint customization have a stable technical basis. For example, haidilao and other chain catering enterprises can launch customized seasoning items for each category of dishes in their stores and realize binding sales.

Third, cooperate with hypermarkets to launch customized products. At present, the online and offline sales channels of condiments are constantly expanding, but generally speaking, the public still rely heavily on the offline channels in the procurement of condiments, among which, traditional supermarkets and hypermarkets play an extremely important role. The cooperation customization between seasoning and hypermarket can be combined with the regional characteristics of hypermarket and the sub-categories of hypermarket to create diversified recuperation products. For example, large stores in sichuan and chongqing can offer customized condiments with spicy taste. In the seafood section of the hypermarket, you can focus on the introduction of fish seasoning cooking package.

Fourth, work closely with the tourism industry to customize seasonings that match the local tourism market. Under the background of “Internet plus”, tourism industry has also ushered in a new development opportunity. The differentiated and personalized development of tourism regions has become a new development trend. Condiment enterprises should strengthen cooperation with local tourism industry, provide innovative services for consumers to meet their “eating” needs, and create condiments that are easy to carry, fresh and tasty, and reflect local tourism characteristics, so as to achieve large-scale promotion effect.

2.2 Channel Innovation

2.2.1 Expand Online Channels

The expansion of online channels should be based on the actual characteristics and development needs of flavoring enterprises. The key points are as follows:

First, through B2B trading platform, to achieve the bulk trading of condiments. B2B platforms are characterized by the fact that both sides of the transaction are enterprises. Therefore, the purchase volume is usually large, the repeat purchase rate is high, and the amount of consumption is high. For condiment enterprises, there are usually more product categories and smaller individual volumes, so the bulk transaction is also an important source of profits. Flavoring enterprises should make good use of domestic mainstream food B2B platforms, such as China food industry network and food business network, and continue to explore the in-depth development of horizontal and vertical industrial platforms.

Second, the use of third-party B2C platform sales. B2C platform is mainly the transaction between enterprises and consumers, mainly including comprehensive and vertical aspects. The former includes jingdong, suning and other comprehensive platforms, while the latter covers wemai. com and sf preferred. Enterprises should fully consider the characteristics of the audience of each platform, scientifically predict the marketing cost of the platform, and make a reasonable choice.

2.2.2 Sales on Self-established B2C Platform

For some large-scale seasoning enterprises, the establishment of the exclusive B2C platform can also be regarded as a good strategy for channel innovation under the background of “Internet +”. The construction of exclusive platform, on the one hand, can reduce the marketing cost of enterprises, on the other hand, is also conducive to improve the brand effect of enterprises, enhance the user stickiness of flavoring products, at the same time, more comprehensive and timely access to relevant data, so as to facilitate enterprises to effectively adjust their products and marketing strategies. For example, angel yeast not only makes full use of the advantages of jd, Tmall and other mainstream B2C platforms, but also builds its exclusive angel e-home electronic mall, thus occupying a more prominent channel advantage.

B2C platform, of course, the self-built need enterprise comprehensive consideration, to recognize the build process, and communication pre-sales consulting, sale, after-sales service and so on need input of manpower, financial resources and technology cost, at the same time,

also need to be fully focused on security and stability of the platform, can introduce a third party when necessary auxiliary platform construction technology institutions.

2.2.3 Develop C2C Distribution and Try C2B Customization According to Customer Needs

Currently, the domestic C2C distribution system has been relatively mature, and its representative platform is taobao. Flavoring enterprises can develop C2C distribution through its taobao customers and distribution system. In addition, enterprises should also enhance the sensitivity and utilization ability of consumer consumption information, and gradually promote the C2B mode to meet the personalized needs of customers. For example, it can provide a small package that covers a variety of spices, and customers can mix and match freely, so as to attract more consumption.

2.3 Promotion of Innovation

2.3.1 Increase the Promotion and Innovation of New Media

New media is a form of media that develops very fast under the background of "Internet +", and has increasingly become an important channel for consumers to obtain information. Compared with traditional forms of TV, newspapers and outdoor advertisements, new media has the characteristics of "short, flat and fast", which can adapt to consumers' increasingly fragmented information acquisition needs. Meanwhile, for condiment enterprises, promotion innovation based on new media can also save more promotion costs.

Commonly used at present, the domestic consumer new media mainly including social media, weibo, WeChat trill, iQIYI, tencent video video platform, such as foreign consumers to Facebook, Twitter, sets, LinkedIn, Youtube, Google is given priority to, such as part of the larger condiment-producing enterprises can choose the one or two foreign new media platform, help enterprise to overseas channels, to improve its recognition abroad. For domestic new media, seasoning enterprises should adopt the strategy of "blooming in an all-round way and focusing on maintenance", and organize corresponding publicity strategies according to the characteristics of the audience of each platform. For example, the audience of diyin platform is relatively young, and it has a natural affinity for novel and interesting publicity methods. Therefore, enterprises can make cartoon and interesting short video publicity to highlight the advantages of flavoring products within 15 seconds to 1 minute, so as to attract more consumption choices. In LinkedIn

platform, for example, as a world famous social platform of employment, increasing enrollment, condiment enterprise can with the identity of the enterprise in Chinese and English website to register, and organize relevant personnel to add company resume, position and so on, so to expand the awareness at the same time, also simplifies the tedious recruitment process, can help enterprises to effectively reduce the cost of hiring, also manifested the enterprise to open, pluralistic values.

2.3.2 Joint Promotion with Related New Media

CNNIC survey report shows that in the Internet age, the influence of the mobile Internet platform expands unceasingly, people use mobile devices to browse fragmentation time also continues to increase, people tend to use its focus on the public number, weibo, micro store form of access to information, and the information is easy to get the audience welcome and trust. Based on this, seasoning enterprises should explore new ways of joint promotion with related new media. For example, they can carry out joint marketing with the food public account with outstanding ranking and wide audience, and expand the radiation space of the enterprise in the form of "soft" advertisement. It can also work with local food, tourism and fashion "big V" to create a regional agglomeration effect through forwarding, preferential offers and other activities.

2.3.3 Joint Promotion with Relevant Industries

Seasoning enterprises should also strengthen joint promotion with related industries, which should focus on the organic integration of tourism and agriculture. From the perspective of joint promotion of tourism industry, seasoning enterprises should innovate their ideas, not be limited to traditional and single promotion platform, nor blindly take advantage of the so-called "large-scale" platform. Instead, they should combine the characteristics of products and give full play to the promotion advantages of highly accurate industry platforms such as food travel notes and tourism BBS. For example, hornet's nest and youyou, as travel platforms covering a wide range of areas, can meet the regional and personalized promotion needs of condiment enterprises and attract the attention of potential consumers more easily. From the Angle of popularizing agricultural joint, condiment enterprise shall, in combination with the hot topic of ecological agriculture, to experience, immersive marketing way, let the consumer really involved in the part of the production process of spices, such as raw materials for picking, this way of promotion can reassure consumers for the product quality, customer stickiness also helps increase flavoring.

2.3.4 Combination and Promotion of LBS

Location service is an emerging technology that continues to develop under the background of “Internet +”. This technology can help enterprises provide personalized and differentiated value-added services based on location information of consumers. The condiment enterprise section can combine with tourism enterprises and catering enterprises in the region to explore a precise promotion path based on location services.

3. Conclusion

Under the new background of “Internet +”, condiment enterprises also need to explore revolutionary innovative development mode, so as to adapt to the continuous update of consumer demand. Seasoning enterprises should combine their products and scale characteristics, grasp the three elements of products, channels and promoters, carry

out targeted innovation, and build a unique brand under the background of “Internet plus”.

References

- [1] Jining Wang, chong Guo, Tingqiang Chen, Shuaibin Wang. Research on the safety management of condiments based on the Internet of things[J]. Chinese condiments, 2018, 43(08): 185-188.
- [2] Condiment industry development: Haitian, jiajia and others lead the market segmentation to attract capital frequently olive branch[J]. China salt industry, 2017(13): 76-77.
- [3] Jianwen Wang. Taste first in food and high end in seasoning[J]. China salt industry, 2017(13): 78-79.
- [4] Ying Li, Qiang Guo, Ying Dong, Shuai Pan. Status quo and development trend of condiments in China[J]. Food safety guide, 2016(12): 46.
- [5] Food science, 2015, 36(09): 298. (in Chinese)

REVIEW

Performance Evaluation of Reactive Routing Protocols in MANETs in Association with TCP Newreno

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ABSTRACT

We inspect the performance of TCP NewReno protocol for data transfer in Mobile Ad hoc networks (MANETs). Dynamic Source Routing (DSR) protocols and AdHoc On-demand Distance Vector (AODV) are standard reactive routing protocols widely used in MANETs. In addition we also have to consider Transmission Control Protocol (TCP) as essential for MANETs since it is one of the widely used internet protocol for dependable data transmission. TCP has its variants namely TCP Reno, TCP NewReno, TCP Vegas and TCP SACK. In this paper we are evaluating the performance of DSR and AODV in association with TCP Newreno with respect to various parameters such as Average throughput, instant throughput, residual energy, packet delivery ratio. The ns-2 network simulator was used for simulation.

1. Introduction

Mobile Ad-Hoc network (MANET) is a bunch of mobile nodes which collaborate with each other for multi-hop communication in an infrastructure less environment. In MANET routing is a challenging task due to various characteristics of a network such as dynamic topology, multipath, link quality, performance metrics, and load balancing parameters between the nodes. In this dynamic environment updating the routing table of every node during the communication is playing a very important role in terms of providing an optimum path according to the current change of topology^[1]. In recent days many routing algorithms were developed like ABR, AODV, DSR, FSDSR, ZRP, ADV, CBRP, FSR, OONP, and ZHLS etc. These protocols divided into different categories such as reactive, proactive and hybrid routing pro-

ocols. Also Nature –inspired routing algorithms-swarm Intelligence such as Ant Colony Optimization (ACO) has been provided a appropriate technique for developing new routing algorithms for MANET. So it is very important to make efficient routing in high unpredictable network. The essential concept of any network is trust worthy delivery of data. Initially for the wired network Transmission Control Protocol (TCP) was designed. Then the TCP is used for wireless network due to its mobility it's affected largely^[2]. TCP works based on sliding window protocol is responsible for reliable data communication. The congestion control mechanism plays a major role in sliding window protocol. TCP always tries to detect the congestion before hand by assuming the packet loss rate and tries to reduce or increase the load in the network as needed. However, in wireless networks, packet loss may not be only due to

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congestion in the network. Hand-offs, link failures, collisions are possible reasons for a packet loss in wireless networks. TCP is unable to distinguish packet losses due to reasons such as link failures, collisions, etc or congestion and thus, results in overall performance degradation.

Our simulations results demonstrate that the reactive protocols AODV performs well under a various conditions in association with TCP Newreno.

2. Literature Review

Jose Aex Pontes Martines et al., proposed bio-inspired algorithm called Ant Dynamic MANET on-demand (Ant-DYMO) routing protocol^[5]. The Ant-DYMO is a hybrid and multi-hop algorithm which has two types of ants for exploring routes for a specific destination. In this algorithm the EANTs carries the information of source node address and all the intermediate nodes passed to reach the source node from the destination node and also it impose pheromone signs along its way. Then EANTs keep updates the path details in the last node pheromone table and broadcast EANT to neighboring nodes. Since Ant-DYMO is a proactive approach the EANTs Keep on updating the routes in a regular interval, so that it has growing the probabilities of finding an alternative route in case route failure^[3]. The ns-2 simulator was used to evaluate the performance of Ant-DYMO with 50 nodes and 20 nodes. Here various configurable parameters were used in Ant-DYMO for the simulation like eants_percentage, eants-history, evaporation factor, eants_route_expiration_time, eants_interval. The basis of DYMO is used in Ant-DYMO implementation. The discussed algorithm was compared with DYMO with respect to different parameters like delivery rate, end-to-end delay, routing overhead and loss rate, and the result says, it comprises the network delay with high probability of quickly finding the optimum route in very less time, high data delivery rate and the data loss rate with less number of node is same as DYMO but with more number of nodes the data loss rate is high because of traffic control over head. The routing overhead is more due to transmission and retransmission of information by the (updating routing table)EANTs. It may also gives outmoded paths information, due to the dynamic change in the network topology. A final analysis of Ant-DYMO states that, Ant-DYMO reduces time in data delivery and shows significant improvement in terms of packet loss.

Mamoun Hussein Mamoun proposed a new proactive routing algorithm called NPR with basis of modified Ant Colony optimization (MACO)^[6]. In this algorithm single hop HELLO message packet is used to build a neighbor list, Which is used to initialize the routing table node.

NPR algorithm uses FANT to reach a specific destination either using broadcast or unicast depending on the availability of a route to the destination. Here the FANT are a light weight packets consist of, Packet ID, source IP address, Destination IP address and the keep rising stack which consist of the intermediate Node ID and the Node_Traversal_Time. All these information's are collected by FANTs while going to the destination. The FANT after reaches its destination, it passes all the information regarding the route to the Backward Ant (BANT) created by the destination node and it dies. Then the BANT choose the next hop by popping the stack and updates the traffic model, routing table. The node elapsed trip time and the reinforcement signal of BANT indicates that the good selection of route. The every discovered path by the FANT by the BANT and update the routing table^[4]. The data are transmitted through the route that has the leading pheromone concentration, which is going to be a primary path. The ns-2 simulation environment was used to evaluate the result with 100 nodes. The evaluation was compared with reactive protocol AODV with in terms of average end-to-end delay, packet delivery ratio, routing overhead. The final analysis says at high mobility, high packet delivery ratio because of proactive path maintenance of the routing table whereas in AODV reinitiate the path discovery process again. Low end-to-end delay due to maintenance of all the leading paths. Due to heavy traffic of route maintenance it leads to more overhead, which is not handled.

Huva Wang et al., proposed a tree growth based Ant colony algorithm (TGBACA), which is mainly concentrating on QoS in multicast routing^[7]. TGBACA aim to trace a tree consists of all the target nodes. In this approach Ant does not select only the target node. The TGBACA has three basic process the first one, Tree Growth - The ant is used to grow a current tree and here the basis principle of Ant Colony Algorithm is used. The multicast tree grows constantly by adding the next node according to the probability and its stop growing when it covers all the multicast members. The second one, Tree Pruning- the grown multicast tree contains some leaf nodes of non multicast member nodes, which will be pruned. Now the final multicast tree is obtained. The final one, Updating Pheromones- the pheromones intensity of the multicast path is keep updates and this will help to increase the process speed. Here the ant number(antnum) enables the cost factor of the algorithm. When the number of ants increases mean while the convergence time also increases. But when the antnum increases certain extent multicast path search will be done randomly. When the network size increases it will lead to slow process, increased process

time, average cost value. The parameters were chosen for the experiment via orthogonal experiment like with different ant number, different scales of topology, and different proportions of group members and compared. Here the final analysis says that the TGBACA acquire the better cost of multicast tree but there is more overhead in terms of growing a tree.

Quality of service enabled ant colony-based multipath routing (QAMR) algorithm is proposed by P. Venkata Krishna et al.,^[8]. This algorithm has two ant agents (FANT, BANT) to evaluate the diverse parameters such as next hop availability (NHA), delay and bandwidth to fulfill the QoS constraints. The QAMR algorithm core concept is constancy of the link for the route discovery to match the requirement of QoS. The FANTs (reactive) are generated by the source which carries the stack of source address, destination address, all the intermediate nodes addresses along with path, bandwidth and hop count, start time to the destination. Here when first time FANT is received by a intermediate node verify about the address of its own in case if the address is not their it adds to FANT and broadcast to all its stable neighbors by its NHA values. The FANT also collects the transmission delay and processing delay of each node. By using all these QoS metrics path preference value will be calculated as soon as the FANT reaches the destination. Only the path which meets the user defined QoS threshold will generate the BANT. By popping the node present in the stack the BANT reaches the destination in unicast manner. For each BANT when it reaches the next hop it will see the probability of preference path by calculating the delay, bandwidth and the hop count. Here the BANT is providing several paths to the destination but for the data transmission the higher pheromone value path is chosen. When the higher pheromone path is overloaded it causes, less available bandwidth, more delay, reduction of nodes energy. Even due to mobility of the node, the NHA of a node goes below the threshold. The QAMR evaluation is done in ns-2 and compared with AODV and ARMAN. The final analysis says that, Due to the mobility of the node frequent route updating is required which is high routing overhead. In QAMR stability of the link is considered as a main parameter, the packet delivery ratio is high. As well as because of route mobility the link failure will increase gradually.

D Karthikeyan et al., proposed an Ant based Intelligent Routing Protocol (ABIRP) to minimize energy utilization of the nodes and prolong the entire network lifetime^[9]. The ABIRP is mainly focused on maximizing the span of network with minimum overhead. In ABIRP Approach in terms of expanding the span of network there are three operations done wisely coordinator election- The node

which has more energy capacity and the more number of neighboring node is elected as coordinator node. Secondly coordinator announcement- The node which cannot reach the coordinator node should become a coordinator node by end of this operation a minimum number of coordinator nodes maintained in the entire network. Since the data are routed through the coordinator node, this topology duty is to give good capacity. The last operation is coordinator withdrawal- Here if the neighboring node can reach the other coordinator neighboring node either directly or indirectly the corresponding coordinator node should withdraw, regarding this periodic monitoring will take place. So here most of the time the non coordinator nodes can sleep and this way energy can be saved. Periodically the non coordinator node will communicate with the coordinator node. In ABIRP algorithm three different types of packets are used like, the information- data packet, Control packet like the neighbour control packets and FANT -to maintain the collection of available nodes to which the transmission take place. The BANT is used to update the pheromone table. The ns-2 network simulator is used to evaluate the ABIRP performance with 50 nodes and compared with unmodified AODV. A final analysis of ABIRP state low energy utilization and that high packet delivery ratio when was compared to AODV protocol.

An Improved Location-Aware Ant colony Optimization based routing for MANETs was proposed by AJIT R. Bandgar et al.,. AntHocNet-LS is an extended version of AntHocNet protocol^[10]. The AntHocNet protocol, whenever the changes in network topology rapidly it should restore the link detail and this leads to the new route discovery process. Here the proposed algorithm introduced the concept of location server, which consists of updated topology and routing path of an entire network. It will serve the information to the requested node in terms of selecting the optimum nearest to the destination. In the proposed algorithm there are two levels of location server maintained. That the lowest level of location server maintains the information of the nodes in the region, the higher level of location server maintains the information of the nodes outside the region. Depending on the requirement the location information is received from either lowest or highest level location server and then data is sent to the appropriate neighbor. The performance of proposed algorithm was evaluated using network simulator-2 with 500 nodes and compared with basis AntHocNet algorithm^[5]. This analysis states that control overhead, great packet delivery ratio, and routing overhead remains constant as the number of nodes increases whereas in AntHocNet approach routing overhead keeps increasing as the number of nodes increases.

Gurpreet Singh et al., proposed An Innovative ACO based routing algorithm for MANETs (ANTALG). This algorithm mainly concentrating on selection of source and destination, which is done randomly and exchange Ant Agent between them^[11]. While the ants moves along its path, The pheromone table and the data structures are created to store the trip time of the node. The ANTALG algorithm creates the community of artificial Ant which is updating the pheromone table. Every ant memory is consist of routing information. The data structure of memory is type of packet used by Ants, Source address and target address Packet length, sequence no, start time of the ant etc. The proposed algorithm consist of, Route setup phase- Here the FANT created in source node and it is send towards the destination, then the source and destination nodes are selected randomly to identify the overall topology. The BANT is created at the destination end and it traverse reverse towards the source in same path of FANT to updates the routing table. Then Route maintenance phase- The FANTs are periodically dispatched by the source node in a proactive manner in order to maintain all the better availability paths. Route discovery phase is the last one – Due to mobility of the node the path can be broken and it broadcast the link failure message and it has to be solved with local repair process in order to find the better path to the destination. The evaluation of the proposed algorithm is done in ns-2. The results are compared with ADSR, HOPNET, AODV with respect to different performance metrics. The results are increased throughput, less packet drop, high packet delivery ratio, more data packet sent, better End-to-End delay, less jitter, large window size.

Gurpreet Singh et al.,^[12] proposed an orientation based ant algorithm (OANTALG) with the basis of ANTALG. The ANTALG process is explained in the same section along with this the orientation factor of ants also included. This orientation factor is used to flood the search node in the proper direction. In the proposed algorithm all the nodes are participating in the path finding process (bi-direction). An OANTALG is orientation based distributed learning algorithm. This way the better path can be found from the destination from source. The evaluation of the proposed algorithm is done in ns-2. The results are compared with ADSR, HOPNET, AODV with respect to different performance metrics. The results are increased throughput, less packet drop, high packet delivery ratio, more data packet sent, better End-to-End delay, less jitter, large window size.

Saptarshi Banerjee et al., proposed a new on-demand power balanced routing algorithm for MANET which is Modified Ant Colony Optimization (ACO) Based Routing

protocol. The major task of this protocol is to reduce the overhead for routing^[13]. This algorithm uses the remaining battery charge of a mobile node as a factor to direct the other nodes, with this can find this algorithm is as power balanced and increasing the process of packet delivery ratio. In the proposed algorithm routing follows the three phases such as Route discovery phase-The sources node creates the FANT which has pheromone value, next hop, destination address is broadcasted to all the neighboring nodes. The information's are collected when the FANT reaches the destination and it dies at the same time BANT is created by the destination, which come back to the source in the same path of FANT. The BANT when it reaches the source the path is established and it dies. Route maintenance phase- the data packet itself maintain the route. Route failure handling phase- based on the missing acknowledgement the path failure is identified and finds the alternative path. The proposed algorithm was evaluated using OMNET++ 4.5. Here was observed decreased packet delivery ratio due to faster process and quick rescaling factor reduces the time duration of reach ability metric in Modified Ant Colony Optimization algorithm.

Shubhajeet Chatterjee et al., proposed Enhanced Dynamic Source Routing algorithm based on Ant colony Optimization which is called as E-Ant-DSR. In this routing algorithm, the path is chosen based on the number of nodes present along the path and congestion between nodes^[14]. Here from source to destination the feasible path is chosen with higher pheromone value and less congestion value. The Evaluation of the proposed algorithm is done in Microsoft visual C++ and MATLAB and compared with other ACO algorithms. The final result obtained better results in terms of data delivery ratio, broken route, routing overhead, and energy consumption.

Hajoui Younes et al., proposed a new structure for load balancing based on mobile agent and ant-colony optimization technique^[15]. The main focus of this algorithm is constructing a multi-agent system to share out tasks on a cluster of heterogeneous nodes. In this algorithm a dispatcher agent is dedicated to distribute the received task to the worker agent in order to select the right path with minimum execution time. The proposed framework system has 3 main layers: user procedure, Task Distribution –Load Balancing, and workers. These layers can be distributed of Procedure agent-allows user to create a task, and the work agents are assigned the received task by dispatcher agent. Tester agent-evaluate the complication of the task, Controller agent- control and collect the states of the worker agent, Worker agent-execute the assigned task. The pheromone table is updated while each task assigned

by the dispatcher. So all the distributed nodes allows, the dispatcher to accumulate the information's to prepare scheduling decisions. Hence the proposed algorithm minimizes the overall execution time and maximizes system performance.

Hyun-Ho Choi et al., proposed a new routing protocol encouraged by a pheromone diffusion and rerouting behavior of ants in real life called regional route maintenance algorithm for mobile adhoc networks. The proposed protocol contains two process as follows, local pheromone diffusion – the pheromones (the routing information) are diffused in the region of the shortest path between the source and the destination by overhearing the one hop neighbors and sharing information about overheard pheromone. The other side the regional route maintenance process- has two types of ants wisely, Exploitation ant- is used to utilize the present shortest path by overheard one hop neighbor and Exploration ant- is used to explore all other alternative paths between source and destination based on the diffused local pheromones information's. Further the pheromone information's can also be classified into two types like Indirect pheromone- it provides indirect probability to reach destination by local pheromone information and Direct pheromone- it provides direct regional route to the destination by using exploitation ants pheromone updates. The proposed algorithm consist of series of operation like routing table structure- is consist of basic multipath information for one hop and additionally the relevant routing table updated time, the value of the pheromone and the type of pheromone whether direct or indirect. Local pheromone diffusion and Regional route maintenance—as we discussed earlier. Link failure and rerouting- since the proposed algorithm has maintained all the possible routes, the link failure can be rectified. Here OPNET simulator is used to evaluate the performance of the proposed algorithm and compared with AODV, MDSDV, AntHocNet algorithms. The result states Smaller amount disruption, gradually decreasing end-to-end delay due to availability of alternative paths so maximum data delivery ratio. According to the performance of network scale the performance decreases as the number of node decreases due to increased propagation time delay and collision of control packets.

Mohit P. Tahiliani: The high-speed TCP variants evaluated in multi-hop wireless networks to analyse the network excepted throughput and network throughput, which used for comparison of throughput at the time nodes are mobile. Through simulations we have studied the behavior of high-speed TCP variants in multi-hop wireless networks by varying the routing protocols such as Desti-

nation Sequenced Distance Vector (DSDV), Ad hoc On demand Distance Vector (AODV) and Dynamic Source Routing (DSR) routing protocols.

Manish DevendraChawhan: The effects of simplex and duplex networks on various TCP variants. The effect of application of SNOOP and ECN on the performance enhancement of TCP along with TCP variants is assessed, improving the performance of TCP over wireless network by implementing cross layer design protocol (Snoop). ECN is used to avoid congestion and Snoop aims at retransmitting the lost packets from base station, avoiding retransmission from the transmitter. The performance of different TCP variants such as TCP Tahoe, Vegas, Reno, New Reno, Sack are analyzed on Wi-Fi scenario. MATLAB is used for simulation. The analysis result shows progress in throughput of Vegas and E-Vegas with and without snoop with respect to other TCP Variants such as Newreno, Reno, Tahoe, Sack.

Shenoy et al., proposed modified transmission control protocol TCP Reno to improve the performance in mobile ad hoc networks. The main focus of this algorithm is resizing the congestion window by various factors of 60%, 70%, 80% and 90%, such a way that the time path connectivity can be regained due to temporary problems in the wireless medium like path break, signal fading etc. Hence the proposed algorithm shows increased throughput and reduction in jitter and end to end delay.

Broadly clustering methods is used in wireless mobile ad hoc networks for the efficient and accurate routing procedures. Here cluster head, cluster member, cluster gateway are plays different roles. The gate way device acts as a conceptual bridge between clusters. Among all the available cluster heads a cluster head may be elected as gateway. For gateway node election Aayushi Jain et al., proposed a novel approach wireless mobile ad hoc networks. The main focus of this approach is electing the gateway on the basis of high rank of devices which determined use of maximum cluster belongings, maximum remaining battery and devices neighbors. This method is analysed using ns2 simulator and various performance metrics that results in good performance.

Samita Rout et al., presented the work on impact of multiple TCP connections in MANET considering different network size. The performance analysis was done DSR, AODV, DSDV for different network sizes creating multiple TCP connections for different mobile nodes considering random way point (RWP) mobility model. Result shows that AODV protocol achieves higher throughput and packet delivery ratio (PDR) at the cost of more packet loss and routing overhead and DSR achieves lower delay as compared to others.

3. Simulation Methods

Our simulation was implemented by using ns-2 network simulator^[16]. We used wireless LAN standard an IEEE 802.11^[17]. We also used CMUuPriQueue for functioning of DSR. The simulated network consisted of 30 nodes randomly placed on a 1637m x 600m field at the beginning of a simulation. We utilized a mobility prototype based on the random waypoint model. To mimic high node mobility, node speeds were randomly distributed between 0 m/s and 30m/s to two nodes, yielding a mean node speed of 15 m/s. These two nodes are moving with a interference of 550 metres and transmission range of 250metres. In this setup energy also considered as one of the factor like initial energy, transaction energy, receiving energy, ideal energy, sleeping energy.

The steady-state conditions of a network was simulated with various background traffic loads generated FTP connections. The TCP packet size was 1500 bytes, and the maximum size of both the send and receives windows was 8.

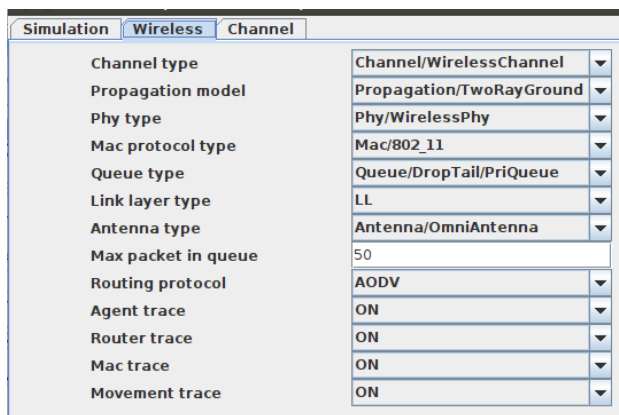


Figure 1. Simulation setup

Figure 1 shows the simulation setup of interaction between TCP-Newreno and reactive protocols AODV and DSR. TCP-Newreno is the most widely used TCP variant with the functions of slow start, Congestion Avoidance and Fast Recovery. The performance of TCP Newreno was evaluated in association with AODV and DSR. The evaluation was experimented with various parameters like instant throughput, Average throughput, packet delivery ratio. Our simulation used TwoRayGround Propagation, Mac/802_11 Mac protocol type, Drop Tail Queue for AODV and CMUuPriQueue for DSR, Omni /Antenna and the maximum packets in queue is 50.

4. Performance Metrics and Results Analysis

4.1 Average Throughput

Throughput is the ratio of the total amount of data that

reaches a receiver from a sender to the time it takes for the receiver to get the last packet. It is measured in bits/sec or packets per second. A raised throughput network is desirable. It is evaluated as follows:

Throughput= No of received Packet / (Time packet received – Time packet sent)

Table 1. Throughput

TCP Variant	Routing Protocol	Average Throughput (kbps)
TCP Newreno	AODV	0.127463
TCP Newreno	DSR	0.124746

Table 1 shows that AODV has maximum average throughput over DSR.

4.2 Instant Throughput

Instant throughput is valuable information for assessing the network performance. It says about the channel utilization and protocol efficiency. A high instant throughput wireless network is desirable. It is calculated as follows:

Instant Throughput= Received Packet Size / Current Time

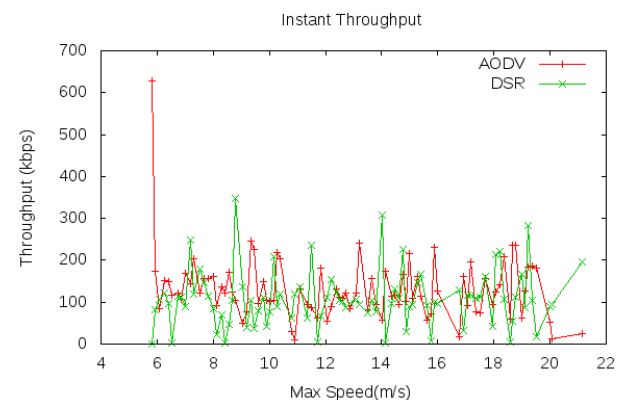


Figure 2. Instant Throughput

Figure 2 shows the performance metrics of two protocols when speed increases the simulation movement changes. Here, can conclude that in AODV protocol the instant throughput is decreased at maximum speed of simulation time, while DSR maintains the constant level.

4.3 Packet Delivery Ratio

The packet delivery ratio is also called as Packet delivery Fraction (PDF). It presents the ratio between the number of packets sent from the application layer and the number of packets actually received at the destination nodes. The metrics used to calculate as

Packet Delivery Ratio = (Received Packets / Packets Sent) *100

It is desirable that a routing protocol keep this rate at a high level since efficient bandwidth utilization is important in wireless networks where available bandwidth is a limiting factor. This is an important metric because it reveals the loss rate by the transport protocols and also characterizes the completeness and correctness of routing protocols.

Table 2. Statistics of packet delivery ratio

Routing Protocol	Sent Packets	Received Packets	Forwarded Packets	Packet Delivery Ratio
AODV	370	321	1707	0.867568
DSR	316	302	2236	0.955696

Table 2 shows the statistics of packet delivery ratio. We can conclude that in association with TCP Newreno the AODV protocol shows low packet delivery ratio while DSR protocol shows high packet delivery ratio.

4.4 Residual Energy

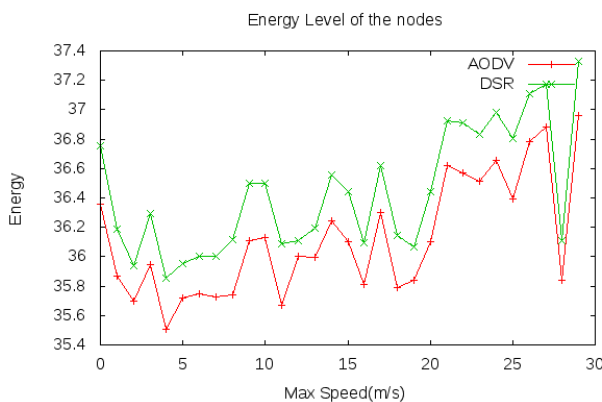


Figure 3. Energy level of the nodes

The energy availability of the nodes is a main limitation of ad hoc systems. The energy efficiency in MANET can be addressed at different layers. The intend of energy-aware routing protocols is to reduce energy consumption in transmission of packets between a source and a destination, to avoid routing of packets through nodes with low residual energy, to optimize flooding of routing information over the network and to avoid interference and medium collisions as told by Parma N and & Sharma (2011).

The residual energy statistics of AODV and DSR showed in the diagram. For our simulation energy level of the node is balanced.

5. Conclusion

IETF MANET working group has standardized AODV and DSR as its reactive routing protocols. In addition,

from the perspective of transport layer, TCP protocol play essential role. As TCP has its variant TCP Newreno, we evaluated AODV and DSR in association with TCP Newreno protocols.

In summary, from the various parameters such as average throughput, instant throughput, packet delivery ratio, residual energy the AODV protocol is giving the maximum throughput in association with TCP Newreno.

References

- [1] Hyun-Ho Choi, Bongsoo Roh, Myounghun Han, Jung-Ryun Lee. Regional Route Maintenance Protocol Based on Local Pheromone Diffusion for Mobile Ad Hoc Networks. Springer, 2017.
- [2] S. Fahmy and T. P. Karwa. TCP Congestion Control: Overview and Ongoing Research. Purdue University, 2001.
- [3] D Karthikeyan, M Dharmalingam. Ant based Intelligent Routing Protocol for MANET. IEEE International Conference proceedings on pattern Recognition, Informatics and Mobile Engineering, 2013.
- [4] AJIT R. Bandgar and sandeep A. Thorat. An Improved Location-Aware Ant colony Optimization based routing for MANETs. IEEE-4th International Conference at Tiruchengode, India, 2013.
- [5] Gurpreet Singh, Neeraj Kumar, Anil Kumar Verma. An Innovative ACO based routing algorithm for MANETs. ELSEVIR-Journal of Network and Computer Applications 45, 2014: 151-167.
- [6] Gurpreet Singh, Neeraj Kumar, Anil Kumar Verma. An Orientation Based Ant Colony Algorithm for Mobile Ad Hoc Network. Springer-Wireless Pers Communication, 2014.
- [7] Saptarshi Banerjee, Arnab Majumdar, Himadri Nath saha, Ratul Dey. Modified Ant Colony Optimization Based Routing Protocol for MANET. Published in IEEE, 2015, 978. Iss.1 4799-6908-1.
- [8] Shubhajeet Chatterjee, Swagatam Das. Ant Colony Optimization Based Enhanced Dynamic Source Routing algorithm for mobile Ad-hoc Network. ELSEVIER-Information Science, 2015, 295: 67-90.
- [9] Hajoui Younes, Omar Bouattane, Mohamed Youssfi, Elhocein Illoussamen. New load balancing framework based on mobile agent and ant-colony optimization technique. IEEE-Conference Paper, 2017, 978-1-5090-4062.
- [10] Hyun-Ho Choi, Bongsoo Roh, Myounghun Han, Jung-Ryun Lee. Regional Route Maintenance Protocol Based on Local Pheromone Diffusion for Mobile Ad Hoc Networks. Springer, 2017.
- [11] Mohit P. Tahiliani, K. C. Shet, T. G. Basavaraju. Per-

- formance Evaluation of TCP Variants over Routing Protocols in Multi-hop Wireless Networks. IEEE 2010.
- [12] Manish Devendra Chawhan¹, Dr Avichal R. TCP Performance Enhancement Using ECN And Snoop Protocol for Wi-Fi Network, IEEE 2010.
- [13] Sharada U Shenoy, Sharmila Kumary M, Udaya Kumar Shenoy. Modified Transmission Control Protocol Reno to Improve the Performance in Mobile Ad Hoc Networks. *Journal of Computational and Theoretical Nanoscience*, 2019, 16(4).
- [14] Aayushi Jain, Dinesh Singh Thakur and Vijay Malviya. A Novel Approach for Gateway Node Election Method for Clustering in Wireless Mobile Ad Hoc Networks. Springer Nature Singapore Pte Ltd, 2019.
- [15] Samita Rout, Sukant Kishoro Bisoy, Mohit Ranjan Panda, Debapriya Panda. Impact of Multiple TCP Connections in Mobile Adhoc Network Considering Different Network Sizes. IEEE, 2014.
- [16] K. Fall and K. Varadhan. NS notes and documentation. The VINT Project, UC Berkeley, LBL, USC/ISI, and Xerox PARC. 1997.
- [17] IEEE Computer Society LAN/MAN Standards Committee. Wireless LAN medium access control (MAC) and physical layer (PHY) specifications. IEEE Std. 802.11-1997. IEEE, New York, NY 1997.

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