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Research Article

Keywords: Translation Strategies, Mobile, Cloud Computing, Software-as-a-Service (SaaS), Multi-Layer Perceptron (MLP), Deep Learning model, Recurrent Neural Network (RNN)

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Abstract
Translation strategies make the individual feel convenient in visualising movies in different languages. The challenge in this translation is in mapping the language words in relation to the language presented in the movie. It is also necessary to consider the mode utilised for viewing the movie. In this research, individuals are considered to make use of mobile devices to visualise the movie with the choice of language translation. In this perspective, Software-as-a-Service (SaaS) cloud computing technology is utilised for storing the data in the cloud environment and making it available as on-demand data. To make an effective translation of the English movie, Multi-Layer Perceptron (MLP), which is a basic deep learning model, is considered for training the translator system for the video data available in the cloud. The proposed model of SaaS with MLP is compared with the regular Recurrent Neural Network (RNN) model for accuracy in translation of the language. The comparative analysis shows that the proposed model has obtained an accuracy of 83%, which is higher than the RNN model.

Keywords: Translation Strategies, Mobile, Cloud Computing, Software-as-a-Service (SaaS), Multi-Layer Perceptron (MLP), Deep Learning model, Recurrent Neural Network (RNN)

1. Introduction
Movies are both works of art and consumer goods. More and more films are being made in English as the Chinese market expands. The Chinese audience should learn the titles before seeing the films. The purpose of a film's title is to convey the film's central theme to the audience. For this reason, we require an accurate economic translation of film titles [1]. After analysing the features and intentions of film names, this research looked at the potential translations and translation principles of the English film name. Without the right title, a film would not exist. An enticing name may be the icing on the cake, the magnet that draws in readers, and the fuel that keeps you going. A film's title, which is often the first thing a viewer sees, should be both memorable and indicative of the film's major theme [2]. Since China is now more open to international influences, there has been a rise in the production and distribution of English-language films there. Titles are the first thing audiences learn about a film, therefore it's crucial that they're translated appropriately from their original English versions. It is possible that the title accurately conveys the film's central theme, which will pique viewers' interest and encourage them to see it in theatres [3]. While it may seem easy to simply translate a film's title, doing it accurately is surprisingly challenging. Creating something that is both aesthetically pleasing and deeply moving may be seen as a fruitful creative effort that encourages reflection and development. It is thus necessary to understand the film's plot and structure in order to provide an accurate translation of the film's title. Then, we must study the guiding principles, acquire the key approaches, and grasp the expression. However, the research on movie title translation took done in a rather gloomy academic context where conflicts are prevalent. Literal translation, free translation, and transliteration are just a few of the methods that have been examined in detail inside scholarly texts that focus on the translation of film titles [4]. Unfortunately, they fail to account for cultural differences and influences when
translating film titles. The study of translation and its significance is also underdeveloped. Literal
translation, free translation, and transliteration are only few of the methods used to adapt English film
titles into other languages. An accurate translation is beneficial to the target audience. The title might
serve as a map for the translator to follow while they work. In an attempt to create greater appreciation
for the original material and to build some type of conversation with the translation [5]. Over the course
of many decades, significant advancements have been made due to the labours of countless generations
of teachers. Nonetheless, the task's inherent complexity prevents it from being enjoyable in any way.
Potential viewers may get confused if there are several variations on the spelling of a film's title.
Different methodologies have been used to influence the translation of movie titles. None of them
earned first prize, but we hope the conclusions of the study will be valuable in future challenges [6].
There aren't many global talents who are knowledgeable in Chinese and can use it to their advantage
when translating Chinese movie titles, therefore most of them are presently translated by local
translation specialists. Experts on the ground also translate foreign film titles. While there has been
some scholarly interest in the topic of translating Chinese film titles into English, the literature on the
topic is sparse in the West. The movie's title in China. In the 1990s, researchers first started to really
examine the efficacy of official translations. With the dawn of the information age came a quick
expansion of information technology, typified by computers, networks, and information equipment,
all of which had a dramatic influence on people's jobs, personal lives, and the area of English translation
studies [7]. Education has grown due to the extensive use of information technology and the broad use
of the English language as a medium of instruction. The amount to which a nation has digitalized its
educational system may be deduced from the quality of its teaching staff, so it's crucial to create a skilled
teaching corps. That's why investing in educators' professional development and ensuring sure they're
familiar with new technology is a national priority [8].

The rise of cloud computing has been significant in the dissemination of mobile education. Platform as
a service (PaaS) is a service that may be used in the development of mobile learning systems, and its
adoption rates have contributed to an overall improvement in the ecosystem for this purpose. Due to
IaaS, the hardware requirements for mobile learning are drastically reduced (IaaS) [9]. SaaS solves a
problem with educational technology that has existed for a long time: its interoperability with other
platforms. Mobile learning has been seen as a potentially game-changing development in education
ever since it was first conceived. Due to cloud computing's numerous benefits, it might be claimed that
cloud-based mobile learning could soon become a vital learning paradigm for the future of education.
Students' use of cloud computing resources in the classroom has considerably benefited education,
information technology, and modernization [10]. When it comes to education, cloud computing's
ability to facilitate the sharing of resources is crucial. Because of cloud computing, traditional teaching
methods have been revolutionized, and students now have a space for shared learning and personal
development. Educators may tailor course design, pedagogical approaches, and content to the unique
strengths of their fields. The use of cloud computing in the field of foreign language education will
facilitate the development of novel foreign language teaching concepts, models, materials, and
pedagogical effects, raising the bar for the informationization of such education. Educators should
have a broad knowledge base [11]. Teachers who possess both information literacy and IT expertise are
better able to implement IT&C integration in a methodical and effective manner. Educators should be
familiar with and comfortable with the fundamental concepts of cloud computing and educational
technologies. Today's educators need to be flexible in their approach to teaching, familiar with cutting-
edge information technology, and able to swiftly adapt to different contexts. The four main ways in
which cloud computing is making a difference in college English classrooms are by raising students'
awareness of the importance of active participation; removing physical barriers to learning; providing
access to a wealth of educational and instructional resources; and fostering a multiplicity of interactions
between students and teachers [12]. This is mostly because of how college-aged students' perspectives
have shifted as a result of learning English in the cloud. Breaking the educational resource monopoly
and making available a wide range of educational and instructional materials through "cloud services"
is crucial for effective resource sharing. This will shift the focus of students' learning from passively consuming content to actively creating their own. Teachers may help students determine whether they are capable of learning English translation on their own, and they can promote the ethical use of translation abilities by having them do research on the topic [13]. Using cloud computing's ingenious optimization approach, the English translation curriculum will provide better outcomes. Our country’s strategy to reform its basic and secondary education systems relies heavily on the use of smart algorithms and new curricula. This goes beyond the simple use of clever algorithms in the classroom and refers to the active integration of subjects and courses at a deep level. The combination of intelligent algorithms and learning has highlighted the need for teachers to employ these tools to fully mobilise and sustain students' learning motivation and to create a contextual learning environment relevant to the teaching subject [14].

China has recently poured a lot of resources into creating, distributing, and managing its teaching resources' software and hardware, resulting in a parabolic growth in the quality and quantity of accessible educational materials in the nation [15]. A number of issues have surfaced as a result of China's unequal economic development, including uneven regional growth; unequal distribution; a lack of creativity; a poor updating rate; a high updating cost; an imbalanced team structure; and low user satisfaction. The researcher suggested that incorporating mobile devices into English translation education could improve student learning outcomes and advance the field [16]. He also claims that lengthy, complicated English words are the most often mistranslated; therefore, learning how to avoid doing so may help readers and listeners become more literate and culturally aware. Although another researcher argued for the multimode approach to be included in teacher education, it did not specify how this method should be used in the classroom [17]. Some of the issues afflicting the current state of digitalization of educational materials include unequal distribution; outdated and plagiarised information; low user satisfaction; slow update rates; expensive update costs; restricted sharing; and an unbalanced teaching team composition. Because of the rising English proficiency of college English translation students, the Education Ministry has undertaken the reform of English translation teaching and amended the English translation curriculum accordingly. Exercises, practice, and other materials for translating from and into English are regularly updated in translation textbooks for English majors. Education infrastructure is also being improved to facilitate the development of competent interpreters and translators. College English classes put all of the emphasis on the professor, so independent study is not encouraged and often isn't even tolerated [18]. Because most English translation students need their instructors' help to understand and analyse critically, modifying the translation of English majors is vital. Most activities for English majors involving translation originate from translation assignments and information found in textbooks, but these rarely interest students. Because teachers typically teach the content of the teaching materials, which are themselves created and structured by teachers in accordance with the teaching materials, it is difficult to innovate in education [19]. The examination of what has been learned is more central to the teaching process than its application. Even if they do well on the grading exams, students' exam-focused understanding of English translation will prevent them from translating effectively. Some students in the classroom will have such a limited command of English that they will refuse to communicate in English, rendering them incapable of successfully completing the learning objectives [20]. Inappropriate language and grammatical errors are common issues with English translations. The English translations fall short in conveying the intended meaning [21]. It's very uncommon for pupils to "translate" their homework into something completely different. Kids are great translators, but they frequently have trouble expressing themselves in words. It's best to utilise your common sense and attempt to mechanically duplicate it in your own language if you can't completely grasp it. Consequently, the English translation will suffer from omissions, word stuffing, and grammar errors, as well as a complicated grammatical structure and muddled logic [22]. Therefore, it is very challenging to achieve the goals of education in light of the aforementioned circumstances. For students who aren't fluent in English, it might be difficult to follow along in class. Furthermore, we have shown that students are becoming increasingly disinterested in English classes in college because
they believe that the material covered would only be a review of elementary concepts [23]. The population is rapidly declining as well. The impact on university-level English translation education has been substantial. The National English Proficiency Test includes an increasing number of questions on English translation [24]. However, the majority of these questions only require candidates to translate brief words. NMT, or neural machine translation, is a cutting-edge technique for automatic translation that makes use of deep neural networks. Hence, the study aimed at analysing the translation strategies for English-language movies under the application of mobile cloud computing combined with deep learning.

2. Materials and Method

Natural language translation (NLT) has shown encouraging outcomes in the translation of many language pairs. Unlike SMT, which needs independently trained sub-components for translation, NMT trains on a single big neural network [25]. The encoder employs the input phrases to produce a vector representation, which the decoder subsequently uses to construct the target language words [23]. This structure includes encoder and decoder networks. Alternatives to RNN that are often used in the construction of encoder and decoder networks include recurrent neural networks (RNN), long short-term memory (LSTM), gated recurrent units (GRU), and bidirectional RNN [26]. While RNN and notably LSTM, have the theoretical potential of resolving long-term dependencies in phrases, the real difficulty of doing so remains an obstacle when it comes to prolonged sentence translation. The problem was handled by employing a method termed "attention mechanism." The primary idea behind the attention mechanism is to focus on the parts of the source phrases that contribute the most to the prediction of each target word rather than interpreting the complete phrase. Words in the source and target languages become more similar [27]. The performance of an NMT system was strongly reliant on the amount and quality of parallel corpora because, unlike the SMT system, which has a distinct language model, the NMT directly predicts the probability of a target sentence given a particular word in the source language. To make matters worse, there are not enough high-quality parallel phrases available for many language pairs, which hinders the progress of machine translation. This is the main roadblock preventing research into machine translation for Indian languages from moving further. Even though studies have shown that neural network designs like the RNN and LSTM networks can maintain long-term contexts, deep learning architectures still have problems interpreting extremely lengthy or complicated words [28]. To aid with the translation problem, an attention mechanism was devised. Prolonged expressions, however, might be challenging to translate [29]. For this reason, we replace longer sentences with shorter ones from the gathered sentences without compressing them. Analyses have demonstrated that the technique fails to correctly capture the dependencies when there are several words in the sentence. This will lower the standard of the system as a whole. Numerous very lengthy phrases can be found in both the English-Malayalam and English-Hindi corpora [30]. When developing an NMT system, it's important to take into account the typical sentence lengths found in the corpus so that you can ensure accurate translations. This is why it's crucial that the corpus have relatively few sentences that are either too lengthy or too short (with a word count of fewer than four).

Translation of languages makes the life simpler in gaining knowledge and culture of cross-borders. It is highly challenging for each individual to learn multiple languages for self-development and even for watching entertainment videos [31]. Hence, a translating strategies based system can be designed for the translation of languages. In this research, videos of English movies are considered for translating to different other languages. In this research, the user is considered to make utilization of mobile applications or mobile devices to view the movie on their movement. It is also considered that the application runs on a Software-as-a-Service (SaaS) based cloud computing technology. The main advantage of SaaS model is to make availability of the data over internet for the user convenient and provide services in an on-demand strategy. According to this models, the movies are assumed to be made available at the cloud storage and with the appropriate user privileges, the user can view the
movie with the aid of translation. In this research, Multi-Layer Perceptron (MLP) is implemented to train the model on languages and hence it can be made immediate availability for the movie with different languages for the user. The proposed architecture model is represented in the Figure 1.

Figure 1: English Language Movie Translation Model

In the modern world, different language-speaking people are willing to watch English-language movies. Today, people are like that, watching movies on their mobile phones. Suppose a mobile user buys software as a service (SaaS) from the cloud computing service model. Then, using this software, many things can also be done. That includes watching any language movie on your own mobile phone.

In the English movies, the translation strategy has many different levels of complexity. The multilayer algorithm used to translate speech recognition is feed forward networks.

Let \( t_1, t_2, ..., t_\alpha \) be the input neurons of the translation strategies for English movies. The input layer \( t_1, t_2, ..., t_\alpha \) does not have the sigmoid function and its only transmits the signal to the hidden layer. Let \( U_{ij}, i = 1, 2, ..., \alpha; j = 1, 2, ..., \beta \) be the weight matrix of the hidden neurons. Then the output of the hidden layer strategy as in Equation (1).

\[
o_i = \sum_{i=1}^{\alpha} t_i U_{ij}
\]

(1)

where the output \( o_i \) neurons in the activation hidden layers and \( U_{ij} \) is the weight between the neuron \( i \) in the hidden layer \( j \) and also \( \bar{\sigma} = U\bar{t} \). The single pole sigmoid activation functions as in Equation (2).

\[
d(t) = \frac{1}{1 + e^{-t}}
\]

(2)

Then by the Equation (1), \( d'_i \) can be represented as in Equation (3).

\[
d'_i = \frac{e^{-t}}{(1 + e^{-t})^2} = d(t). (1 - d(t))
\]

(3)

Then the output of the translation strategy is calculated as in Equation (4).

\[ y_h = \sum_{i=1}^{\beta} d_i W_{hi}, \ h = 1, 2, \ldots, \gamma \]  \hspace{1cm} (4)

where \( \gamma \) is the number of outputs of the translation strategies and \( y_1, y_2, \ldots, y_\gamma \) is the output the translation strategies of the English movies and also \( \bar{\gamma} = \bar{W} \bar{d} \). The weight \( W_{hi} \) between the neuron \( i \) in the hidden layer \( h \). The hyperbolic or bipolar sigmoid function defined as the Equation (5).

\[ d(t) = \frac{2t \ (1 - e^{-2t})}{1 + e^{2t}} \]  \hspace{1cm} (5)

Then by Equation (4) and Equation (5), the following Equation (6) is obtained.

\[ d_i' = \frac{4 \ e^{-2t}}{(1 + e^{-2t})^2} = (1 - d(t))(1 + d(t)) \]  \hspace{1cm} (6)

The error per epoch is calculated using the Equation (7).

\[ E = E + \frac{(\bar{\gamma} - \bar{\gamma})^2}{2} \]  \hspace{1cm} (7)

The backward propagation algorithm is based on the principle of gradient. The gradient of the errors for the neurons in the outer layer is calculated using the Equation (8).

\[ \delta_y = d' e_d \]  \hspace{1cm} (8)

where \( d' \) is the derived activation function and \( \bar{\gamma} = \bar{y} - \bar{\gamma} \) and also the decision error vector is \( e_d = W^T \bar{\gamma} \). By using the single pole sigmoid function, the above Equation (8) can be written as in Equation (9).

\[ \delta_y = d(1 - d) e_d \]  \hspace{1cm} (9)

The gradients for the weight between the hidden layer \( h \) and the output layer of translation strategies are obtained using the Equation (10) and Equation (11) respectively.

\[ \Delta W_{hi} = \Delta W_{hi} + o_i \delta_h \]  \hspace{1cm} (10)

\[ \delta_h = o_i(1 - o_i) \sum_{h=1}^{\gamma} \delta_h \cdot W_{hi} \]  \hspace{1cm} (11)

where \( \gamma \) is the number of outputs of the translation strategy for English language movies and \( \delta_h \) is the gradient of the errors for the neurons.

\[ \Delta U_{ij} = \Delta U_{ij} + t_i \delta_h \]  \hspace{1cm} (12)

The equation is the gradient of the weights between the \( i^{th} \) input layer neuron and the \( j^{th} \) hidden layer of the translation strategies for English language movies and \( t_i \) is the input of the \( i^{th} \) neuron as presented in Equation (12). The weights all the connections will be updated based on the gradients of the weight as presented in the Equation (13).

\[ U_{ij} = U_{ij} + \xi \Delta U_{ij} \]  \hspace{1cm} (13)
where $\xi$ is the learning rate. By using the momentum method, adding new term to adjust weight by 
\[ \eta \Delta W_{hi}(k - 1), \] then the Equation (14) is obtained.

\[ \Delta W_{hi}(k) = \Delta W_{hi} + \eta \Delta W_{hi}(k - 1) \quad (14) \]

Using the parameters $u$ and $v$ and its depends on the successive sign of the gradients, then the Equation 
(15) is derived.

\[ \xi_{ij}(k) = \begin{cases} 
    u, & \xi_{ij}(k - 1), sgn(\Delta U_{ij}(k)) = sgn(\Delta U_{ij}(k - 1)) \\
    v, & \xi_{ij}(k - 1), sgn(\Delta U_{ij}(k)) = -sgn(\Delta U_{ij}(k - 1)) 
\end{cases} \quad (15) \]

$\xi_{ij}(k)$ –learning rate and also defined by using the method of variable learning rate.

The back propagation training algorithm gives an half the square of the Euclidean norm of the output 
error vector as in the Equation (16).

\[ E(t, U, W, y) = \frac{1}{2} |e_y|^2 \quad (16) \]

3. Results and Discussion

In this research, the dataset is collected from Kaggle which includes movies of English language of 
more than 25,000 videos and different genre and company of production companies. One thousand 
movies are chosen in random on different genres for this research analysis.

![Audience Choice of Language Selection](image)

**Figure 2: Audience Opinion in Translation**

Figure 2 shows us Audience opinion for the English movies which is translated to a multiple language 
movie. In this research, the movie is considered to be translated to three languages such as Chinese, 
Japanese, and French. It helps to understand the percentage of audience interested in watching movies 
in the translated version. It can be observed from the results that 36.9% of Chinese persons are satisfied 
with the translated movie video which is 3.6% increase than Japanese persons and 7.1% increase than 
the French language translation.
In this Figure 3, profitability of translation based on the different genres of the movie. Romance, comedy, drama, animation, fantasy, and action were the different genres considered for this research through mobile computing technology. Comedy movies that are translated from English language to different language have attained more profit compared to the other genres of movies which is 51% increase than the Drama type genre.

This Figure 4 shows the difference between the lead studio movies which is translated from English to multiple languages and their Profit attained. It helps easily to understand that the translation strategies performed in Lead Studio for different production companies. Among which Independent Production
Company was able to attain higher profits of 118 million than the other production companies. The least profit of two or three million is attained by the CBS and the New Line Production companies.

Figure 5: Profitability Analysis based on the Language of Translation

In this Figure 5, it can be found that the difference in profit for translating the English movies to different languages such as Chinese, Japanese, and French. It is seen that Japanese language have obtained highest profit of 157 million than the Chinese and French which have received only 103 million and 95 million respectively.

Figure 6: Analysis based on the Audience Response

Figure 6 shows the audience response for the translated movies genres. Among the translated movies of different language the comedy genre has obtained greater response of the audience with 53.80%. However, romance genre has managed to obtain next higher response of 20.10% as per the translation mechanism and quality of translation.
Table 1: Audience response

<table>
<thead>
<tr>
<th>Genre</th>
<th>Audience response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comedy</td>
<td>53.8%</td>
</tr>
<tr>
<td>Romance</td>
<td>20.1%</td>
</tr>
<tr>
<td>Drama</td>
<td>17.8%</td>
</tr>
<tr>
<td>Animation</td>
<td>5.73%</td>
</tr>
<tr>
<td>Fantasy</td>
<td>1.65%</td>
</tr>
<tr>
<td>Action</td>
<td>0.92%</td>
</tr>
</tbody>
</table>

Table 1 illustrates the audience response based on the genre. From the table, it can be observed that most of the people preferred comedy as their favourite genre. So, they like to watch such comedies in different languages.

Figure 7: Accuracy analysis

Figure 7 illustrates the accuracy analysis in movie translation. By doing analysis, it is observed that RNN has obtained a training ratio of 76% and MLP has obtained an training ratio of 86%. It states that the proposed model works better than the existing model.

Table 2: Accuracy Analysis in Movie Translation

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent Neural Network (RNN)</td>
<td>76</td>
</tr>
<tr>
<td>Multi-Layer Perceptron</td>
<td>83</td>
</tr>
</tbody>
</table>

In this research, a Multi-Layer Perceptron (MLP) model for translation strategies of movies in our data is performed. Table 2 represents the accuracy analysis of Recurrent Neural Network and Multi-Layer Perceptron which is 76 and 83 respectively.
Conclusions

The use of translation strategies enables people to visualise films in other languages with ease. The difficult part of this translation is relating the language words to the language used in the film. It is also essential to take into account the method chosen for watching the film. In this study, people are taken into account who use mobile devices to watch movies with their preferred language translation. In this view, data is stored in the cloud environment and made available as on-demand data using software-as-a-service (SaaS) of cloud computing technology. Multi-Layer Perceptron (MLP), a fundamental Deep Learning model, is taken into consideration for training the translator system for the video data available in the cloud in order to generate an accurate translation of the English movie. For language translation accuracy, the proposed SaaS with MLP model is compared to the conventional Recurrent Neural Network (RNN) model. The comparative analysis reveals that the suggested model outperformed the RNN model with accuracy of 83%.

Data Availability Statement

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Authors Contribution: YL analyzed the experimental results, designed and performed the experiments and drafted the manuscript.

Ethics declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

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