FB-PROPHET MODEL FOR TIME SERIES FORECASTING IN SALES

Thanh Cong Tran

Ho Chi Minh City University of Economics and Finance
congtt@uef.edu.vn

Abstract

Forecasting techniques based on time series analysis are applied in various fields such as banking, sales, stock market, and healthcare. Forecasting chain of ten stores in sales using time series can improve sales in the business environments. Recently, there are many tools to use for forecasting, but the Facebook Prophet (FB) tool is the latest and has demonstrated its effectiveness in term of accuracy. This paper proposes the FB Prophet tool to forecast the data of chain of ten stores. Based on the experiment, it is concluded that FB Prophet is a highly accurate predictive model and shows positive outcomes.

Keywords: *FB-Prophet, Prediction, Time series.*

1. Introduction

Time series data analysis is helpful to achieve worthwhile statistics and many other attributes of data in an overall business environment. Time series forecasting models play a crucial role in forecasting models, where time is considered as a key factor. These forecasting models have a great influence on predicting sales in the future and managing the operation of business. It is also vital since various forecasts involve time of many components which should be addressed with care in order to make predictions when the actual outcome is unidentified. In order to identify the primary element of an event in time series, it is necessary to clearly understand the data pattern involved to time. There are four main components in time series analysis of data, namely level, trend, seasonality, and noise. The level component is considered the fundamental value employed in time series data, the seasonality component is represented as a curve that can rise or decline over the period of time. Moreover, seasonality is expressed as a cycle or pattern over the period of time and noise reveals variation in data observed.

Recently, an open source, named forecasting tool FB prophet which is popular for use in the library of python and R programming languages was developed by Facebook. From the perspective of business, FB prophet was generated to meet forecasting needs in sales. FB prophet has attributes related to time series data which is observed hourly, daily and monthly from year to year. FB prophet also considers break intervals or holidays which are known in advance. Additionally, FB prophet takes into account trends, outlier detection, and missing data.

Furthermore, Prophet works on a regression model with trends related to a regression curve or a modular curve for an increasing trend, a seasonal component based on Fourier series, a seasonal component weekly.

FB prophet is relied on the technique of curve fitting in Bayesian model. It is easy to understand parameters and it also does not request a lot of time series data for forecasting. This technique is best suited when seasonal properties are indicated as strong influencing factors in time series data. FB prophet handles better in case of missing data, variating trends and detecting outliers. In real-world situations, such as sales

predictions, such variations must be tackled. In this paper, we perform the analysis of univariate time series for chain store sales data employing FB Prophet tool.

2. Related works

Many studies have been done to forecast time series employing FB prophet in different areas. In [2], the forecasting framework is used to predict future demand for product categories. The developed method also indicates the time series curve for each product in the product category. In [3], an adaptive Kalman filter is employed together with FB Prophet so as to forecast maximum power demand with improved predictability. In [4], SARIMA and FB oracle algorithms are employed to forecast power grid failures. ARIMA model and its steps are discovered in this proposed model.

Shikha Gaur et al. [5] proposes a prediction model based on prophet ARIMA and FB to predict the trend of COVID-19 infections. This proposed model helps identify outbreaks and irregularities of COVID-19 in India and abroad. Nevertheless, the research is constraint on the healthcare sector and could not be used for the areas of sales and e-commerce. In [6], Liyun Su et al. uses the polynomial function to approximate coefficients in autoregressive prediction. These models can perform better based on the technique of FB prophet.

A number of research relied on neural networks has been implemented in the field of time series forecasting between 2006 and 2016. In [7], these methods related to neural network are reviewed by Ahmed Tealab. In [8], CemKocaket et al. suggests a fuzzy autoregressive moving average (ARMA). In [9], forecasting models ARIMA and FB Prophet are employed to forecast closing prices of stock markets. This method works with the dataset which is separated into two phases, namely training and validation set which depend on daily, weekly and monthly transactions. The results show that ARMA-based model only works efficiently in short-term predictions like daily or weekly while prophet FB gives good results for long-term stock predictions like monthly or yearly. Research work is primarily limited to predict the prices of stock, and these models are implemented to sales prediction. In [10], a similar predicting approach is developed to predict stock prices, but it should be improved the overall performance of the predictive model. Time series analysis plays a key factor to predict health perception and prevention-involved information to the society.

A similar study was performed for the sectors of health and air pollution [11, 12, 13] to predict pollution harm and mortality rates in different nations. According to Poisson regression and GAM, S-Plus' generalized additive modeling (GAM) software is tested [11] to analyze time series data on the number of air pollution deaths. GAM is considered as expansion of a linear model based on a non-parametric function. FB-based method can make an improvement to predict accuracy in time series analysis of data.

Merchandisers and entrepreneurs employ tools involving demand forecasting to plan the operations of business. Various tools are available to perform such forecasting either model-based or model-free. Among them, the model-based method is more powerful. Cyclic Boosting supervised learning which is an effective approach is one of model-based approaches [14]. The primary concept of the proposed method is to take advantage of the benefaction of each attribute to predict the objective function. The Cyclic Boosting

supervised learning method is also based on the kernel regression model and uses normalization technique to refine the model while smoothing technique removes noise. However, FB prophet performs better in case of simplicity and gives more accurate results. In [15], an ARIMA model predicts environmental degradation. According to NLP and Fuzzy C Means, this method uses Microsoft Power BI to analyze data, display and customize the dashboard. The performance of this method is better than preceding approaches, but FB prophet is much more accurate and ease of use when predicting issues related to time series.

3. FB prophet model

Based on an additive regression model, FB prophet [1] prediction can be expressed as (1):

$$y(t) = g(t) + h(t) + s(t) + e_t \quad (1)$$

Where: y(t) is the additive regression model, g(t) is the trend factor, h(t) is the holiday component, s(t) is the seasonal component, and e(t) is the error term. The trend factor g(t) can be modeled as Logistic Growth Model and Piece-wise linear model. Logistic Growth Model which is expressed as (2) indicates growth in different stages. The growth in the first stage grows exponentially, then reaches a period of saturation, from which it is linear growth.

$$f(x) = \frac{L}{1 + e^{-k(x-x_0)}} \quad (2)$$

Where: L depicts the maximum value of the model curve; k is denoted as the growth rate; x_0 is expressed as the value of x at sigmoid point.

Additionally, Piece-wise linear model shown as (3) is customize based on the linear model where x shows various range with distinguished linear relationships.

$$y = \beta_0 + \beta_1 x + \beta_2 (x - c)^+ + \varepsilon \quad (3)$$

The method employed for time series forecasting based on FB Prophet is depicted in Figure 1.

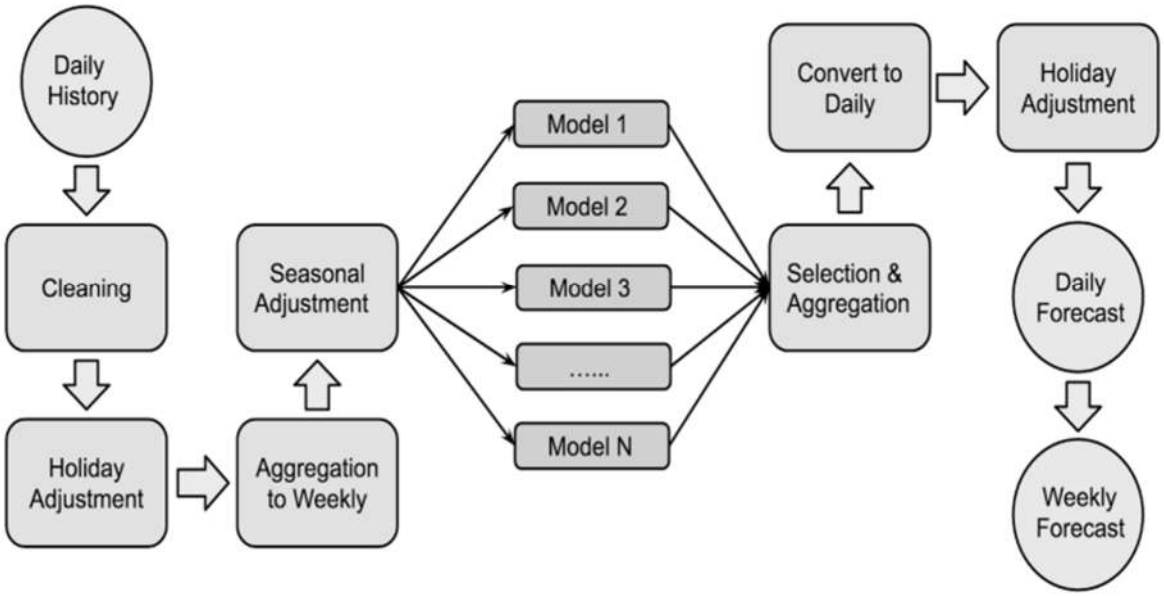


Figure 1. Diagram of time series forecast

4. Data description and evaluation metrics

4.1. Data description

The store chain dataset of ten stores is used in this paper [16]. This dataset was collected over a 5-year period from 2013 to 2017. The data field of the dataset includes: date, store, item, and sales. Figure 2 reveals the total daily sales of all stores. Figure 3 shows the total daily sales for each store. Total daily sales seems to be trending fairly steadily and gives an indication that the FB prophet model may be suitable for predicting store-level sales.

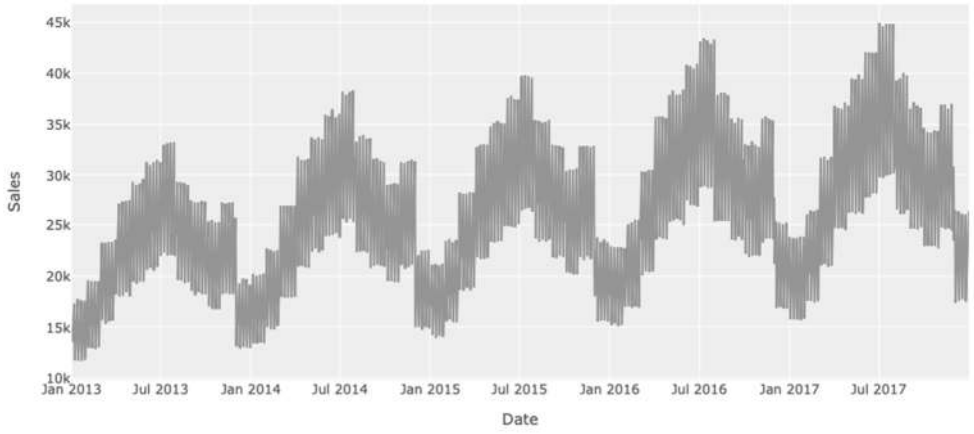


Figure 2. Total daily sales of all stores

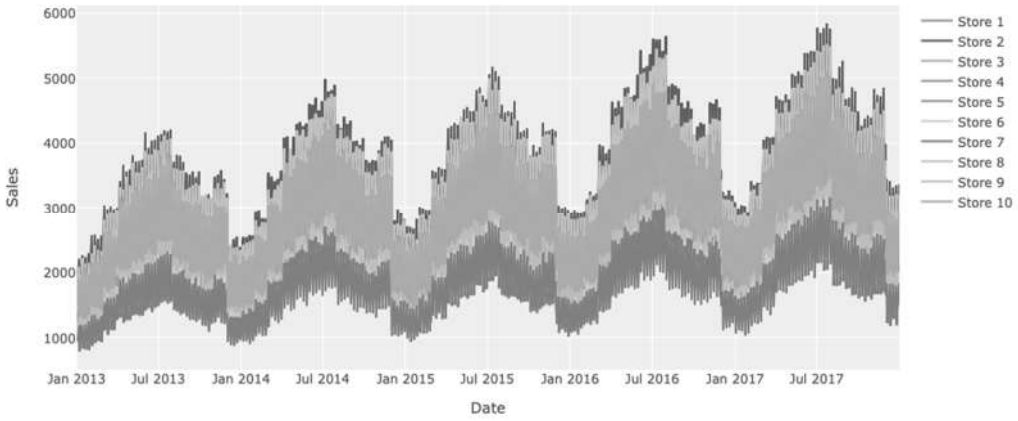


Figure 3. Total sales by day by each store

4.2. Evaluation metrics

In this paper, the evaluation metric to consider the accuracy in FB prophet models is the weighted mean absolute percentage error (WMAPE) [17]. Based on opinions of many business professionals, financial data analysts, and accountants, WMAPE metric has high reliability to evaluate the accuracy of the forecasting models.

WMAPE is a way to measure the accuracy of financial and statistical projections relative to actual or actual results for a sample. The different parts of WMAPE are weight, mean, absolute, percentage, and error. Weighted means that there is a component against the measurement results of the computation. Average means that the result of this calculation is an average of the accuracy of the predictions. Absolute means that regardless of whether the actual result is more or less than predicted, the computation will

provide a positive number. Percentage means the computation results in percentage format for ease of use. The error means that the result of the computation is a measure of the difference between the forecast and the actual result.

Typically, WMAPE is used to compare forecasts over a long period of time, which reveals a general trend as to whether forecast is accurate rather than a very specific date or time. WMAPE can be used in conjunction with other predictive measurements to better understand the accuracy and responsiveness of data models. The formula for WMAPE is expressed as (4):

$$\text{WMAPE} = \frac{1}{n} * \frac{\sum(|Actual - Forecasted|)}{Actual} * 100 \quad (4)$$

Where: *n* is the size of the sample; *Actual* is the actual value for a certain period of time, *Forecasted* is the expected value over a certain period of time.

5. Results

The results of the store sales prediction of 10 stores are shown in Figure 4. The blue line is the forecast value while the black dots are the actual value. We can see that the blue line matches the overall trend of the data with some outliers still present, which is a pretty good fit. In addition, we now need to test how successful the model is on data it hasn't seen yet, specifically 2018.

When forecasting trends in 2018, the WMAPE metric is used to measure the accuracy of the forecast trend in 2018. Table 1 describes the results of the WMAPE metric for the sales forecasting model of each store, from store 1 to store 10. Thereby, we see that the prediction results based on WMAPE metric are quite high, over 94% in all predictive models of stores.

Table 1. Results of WMAPE method for store-by-store forecasting model

Metric	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	Store 7	Store 8	Store 9	Store 10
WMAPE (%)	94.456	94.50	95.143	94.492	94.347	94.867	94.516	94.870	94.828	94.767

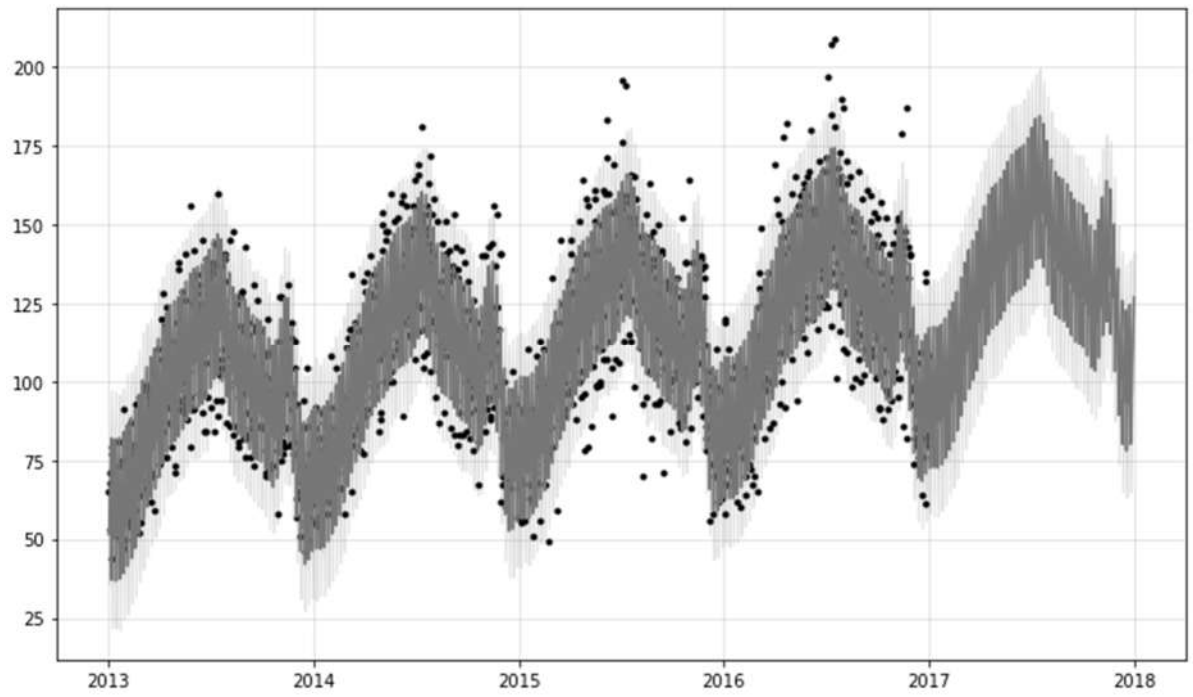


Figure 4. Forecasting results of 10 stores in sales

6. Conclusion

In the proposed research work, the FB Prophet model is implemented for sales forecasting. We utilize the store chain dataset of ten stores collected between 2013 and 2017 for testing. We have achieved that the prediction implemented using FB Prophet is extremely adjacent to reality. The proposed tool is indicating great performance in forecasting of time series data with minor error accuracy. Nevertheless, scalability is another challenge for the analysis of a large dataset. Transformation learning can be used together with FB Prophet in order to enhance scalability and handling of large datasets. Real-time forecasting with high accuracy relies on the model employed for training and validation.

References

[1] B. Kumar Jha and S. Pande, "Time Series Forecasting Model for Supermarket Sales using FB-Prophet," 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), Erode, India, 2021, pp. 547-554, doi: 10.1109/ICCMC51019.2021.9418033.

[2] Emir Zunic, Kemal Korjenic, Kerim Hodzic, Dzenana Donko, “Application of Facebook's Prophet Algorithm for Successful Sales Forecasting Based on Real-world Data”, International Journal of Computer Science and Information TechnologyInternational Journal of Computer Science & InformationTechnology (IJCSIT), Vol 12, No 2, PP. 23-36, April 2020.

[3] Chen Guo, Quanbo Ge, HaoyuJiang,Gang Yao and Qiang Hua, “MaximumPower DemandPrediction UsingFbprophetwith Adaptive Kalman Filtering”,IEEE Access, 2020.

[4] Yi Yan, Bo Li, Jianyi Xiao, Yunde Liang, Yanwei Shang and Kaidong Zhou, “Comparative Study on Prediction Algorithms for Power GridSystem Access Failure Times”, IOP Conf. Series: Earth and Environmental Science ,252, 2019032183 IOP Publishing

[5] Dr. Shikha Gaur, “Global Forecasting of COVID-19 Using ARIMA Based FB-Prophet”, International Journal of Engineering Applied Sciences and Technology, Vol. 5, Issue 2, ISSNNo. 2455-2143, 2020, pp. 463-467.

[6] LiyunSu, ChenlongLi,"LocalPredictionofChaoticTimeSeriesBased on Polynomial Coefficient Autoregressive Model", Mathematical Problems in Engineering, vol. 2015, Article ID 901807, 14 pages, 2015.

[7] Ahmed T ealab,"Time series forecasting using artificial neural networks methodologies: A systematic review", Future Computing and Informatics Journal,vol. 3, Issue 2, pp. 334-340, December 2018.

[8] CemKocak,"ANewHighOrderFuzzyARMATimeSeriesForecasting Method by Using Neural Networks to Define Fuzzy Relations", Mathematical Problems in Engineering, vol. 2015, Article ID 128097, 14 pages, 2015.

[9] WintNyein Chan, "Time Series Data Mining: Comparative Study of ARIMA and Prophet", Journal of Computer Applications and Research, Volume 1, No 1, 2020, pp. 75-80.

[10] A. A. Adebiyi, A. O. Adewumi, C. K. Ayo "Stock Price Prediction Using the ARIMA Model", UKSim-AMSS 16th International Conference on Computer Modelling and Simulation, pp.106-112.

[11] Dominici F. "On the Use of Generalized Additive Models in Time- Series Studies of Air Pollution and Health. American Journal of Epidemiology".vol. 156, Issue 3, 2002, pp. 193-203

[12] Samet,J&Zeger,S&Dominici,Francesca&Curriero,F&Coursac, I & Dockery,Douglas & Schwartz, Joel &Zanobetti, Antonella.(2000).The National Morbidity, Mortality, and Air Pollution Study. Part II: Morbidity and mortality from air pollution in the United States. Research report (Health Effects Institute), vol. 94, discussion 71,pp. 5- 70, 2000.

[13] Schwartz, Joel & MARCUS, ALLAN, 'Mortality and air pollution in London: a time series analysis", American Journal of Epidemiology, vol. 131, pp. 185-194, 1990.

[14] Wick, F.&Kerzel, U.&Hahn, M.&Wolf,M.&Singhal,T.&Feindt, M., "DemandForecastingofindividual Probability Density Functions with Machine Learning", PP. 1-20, 2020.

[15] Anand, J.V."AMethodologyofAtmosphericDeteriorationForecasting and Evaluation through Data Mining and Business Intelligence." Journal of Ubiquitous Computing and Communication Technologies (UCCT) 2, no. 02(2020): 79-87.

[16] Kaggle, https://www.kaggle.com/c/demand-forecasting-kernels-only/overview.

[17] Indeed, https://www.indeed.com/career-advice/career-development/weighted-mean-absolute-percentage-error.

USING AI CODE IN C# PROGRAMMING

Nguyen Ha Giang

Ho Chi Minh City University of Economics and Finance
giangnh@uef.edu.vn

Abstract:

Recently, the appearance of ChatGPT, a generating AI application tool, has been widely used and has attracted a lot of attention from the technology world. The application of ChatGPT has spread across different industries because the ability to answer the results is considered useful and the completion level of the results is very high. Based on ChatGPT's answer, users can adjust, add and expand to get the content they want without having to spend a lot of time and effort. Within the framework of the article, we will cover the aspect of leveraging the ChatGPT tool for programmers, software developers, or software engineers. The illustrative examples use C# language and other programming languages, ChatGPT also handles the same results. Making good use of this support tool will help build computer programs faster, saving programmers' effort. Especially for new programmers, you can take advantage of ChatGPT to better support your work.

Keywords*: ChatGPT, computer programming, C# programmer, AI Code.*

1. Introduction

In recent years, the explosion of applications using artificial intelligence platforms has brought about very positive effects. Previously, AI applications focused on specialized and specialized activities, serving groups and organizations, but today, AI has made strong development steps and crept into all human activities, can be likened to an extended arm, an extra brain for a person.

One of the AI applications that is known and widely used by the public in recent times is ChatGPT, an intelligent chatbot that can answer questions in many different fields and the results are evaluated by users. High. ChatGPT can generate content on demand and human descriptions of a certain field.

Within the framework of the article, ChatGPT applications will be presented to support programming work, accompanied by illustrative examples for each application. The selected programming language is C# (ChatGPT can answer all popular programming languages today). In addition, the article also gives some comments on the advantages and limitations of using this tool to support programming.

2. AI, Generative AI, ChatGPT and applications

Artificial Intelligence (AI) is an area of computer science and technology that deals with the development of computer solutions and algorithms to help computers learn and make decisions on their own human. The main goal of artificial intelligence is to create intelligent computer systems capable of solving complex problems and making decisions based on information provided or gathered.

To achieve this goal, AI researchers must build mathematical models and algorithms to solve problems such as image recognition, natural language processing, data analysis, forecasting, decision support, and many other applications. This includes finding the most suitable approach to process input data, building machine learning models, and training these models through machine learning algorithms and techniques, deep learning, and more.

Artificial intelligence is widely applied in many fields, from applications such as facial recognition, autonomous vehicles, and financial investment advice to the fields of health, statistics, military, communication, education, and many other industries.

Generative AI is an area of artificial intelligence that focuses on creating new content, not limited by original training data. Using generative models such as Generative Adversarial Networks (GANs) or Variational Autoencoders (VAEs), generative AI can generate images, music, text, and other content, based on input data.

In GANs, two neural network models interact, one called the generator model and the other called the discriminator model. The generative model tries to generate new samples from the training data, while the discriminant model tries to distinguish between the samples generated by the generative model and the real ones from the training data. The two models will interact with each other through the training process to create new samples of better quality.

In VAEs, an encoder model is used to convert the input data into a latent space, and then a decoder model is used to convert points in this latent space into new output data. Once trained, the model learns to generate new data based on the basic characteristics of the training data.

With its ability to create new and diverse content, generative AI has been used in a wide variety of applications, including photo and video production in the media and entertainment industries, creating newspaper content, and creating new content. and even new product designs. However, the use of generative AI also poses some challenges, including issues of ethics and the quality of the generated content.

2.1. What is ChatGPT?

ChatGPT is a group of AI applications in the direction of generating AI. Specifically, ChatGPT is a large automated language model trained by OpenAI, based on the Transformer Network's GPT (Generative Pre-trained Transformer) architecture, and has dimensions up to millions of parameters. This model has the ability to read and understand the content of the input text, then give an answer or generate new text based on the context and available information.

ChatGPT is trained on a large amount of data from various sources on the Internet, including English and other languages. With the ability to automatically learn from data and improve quality over time, ChatGPT can answer questions, solve problems, and provide the information requested by users naturally and smartly.

ChatGPT has many practical applications, including support for chatbots, online conversations, customer support, education and research support, and many more.

Features of ChatGPT

Answer questions: ChatGPT can answer users' questions on a variety of topics, including history, science, entertainment, culture, business, and more.

Create new content: ChatGPT can generate text snippets, from product descriptions to longer articles, or even essays, letters, and more.

User interaction: ChatGPT can interact with users and answer their questions, discuss with them different topics, or give advice on something.

Language translation: ChatGPT can translate documents into many different languages, helping users to read and understand information from other languages.

Synthesize information: ChatGPT can aggregate information from different sources and help users save time searching for information.

Make predictions: ChatGPT can make predictions about future events or trends based on available data.

2.2. Applications

Education: ChatGPT can assist teachers/lecturers and students/students in teaching and learning. For example, ChatGPT can answer students' questions or guide teachers in lesson planning.

Health: ChatGPT can assist medical professionals in diagnosing diseases or providing medical information to users. For example, ChatGPT can answer questions related to disease symptoms, provide nutritional advice or guide users to perform exercises.

Business: ChatGPT can assist businesses in consulting products, services or managing customer care. For example, ChatGPT can answer questions about products, pricing, or warranties, or help customers with questions.

Communication: ChatGPT can assist journalists or media in writing articles, finding information, or providing information to readers. For example, ChatGPT can generate descriptions of an event or give advice to readers.

Scientific research: ChatGPT can assist researchers in finding information, analyzing data, or generating reports. For example, ChatGPT can search for scientific articles related to a specific topic or generate descriptive snippets of data.

History, society, current affairs: can aggregate information in ChatGPT database, and information on the Internet. In addition, the system can answer questions about general knowledge, providing simple explanations of complex in-depth concepts.

Other areas of synthesis: Giving advice on certain topics; Summarizing long paragraphs; Translating text into different languages.; Helps with language learning by providing definitions and examples of words and phrases; Creates personalized content, such as emails and social media posts; Creates music and art based on user input and preferences.

It can be said that ChatGPT's knowledge base is quite extensive, trained from big data, from many different sources, and updated regularly. So the ability to meet user requirements is quite good.

3. ChatGPT application in programming

Through part 2, ChatGPT has the ability to support many different fields, from general to specialized in certain narrow areas. In part 3, we will focus on presenting applications of ChatGPT to support computer programming. For each of the following application sections, only some typical and basic examples are given. From these examples, programmers can completely apply to similar and more complex situations. Just as ChatGPT's capabilities are not limited to computer programming languages, programmers can ask for any arbitrary computer language.

3.1 Generating source code

ChatGPT can understand and interpret the needs of programmers using its natural language processing skills and provide corresponding code snippets. When it comes to repetitive tasks or boilerplate code, this can save programmers a lot of time.

An example chatGPT generates source code at the request of the programmer as shown in Figure 1.

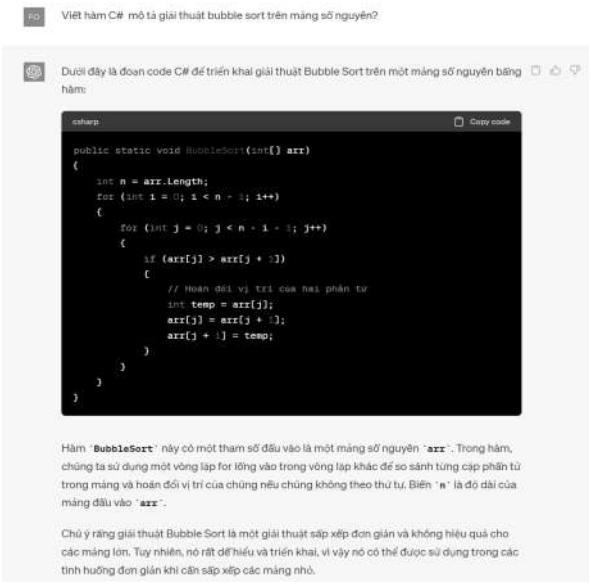


Figure 1. *Generating code on demand.*

In the example, users can ask questions in Vietnamese language and the answering system is also in Vietnamese, including the source code of the sample function and a very detailed and easy to understand function explanation.

3.2 Find bugs or refactor the source code

In addition to generating source code according to the user's discretion, the system can help find errors or restructure the program code to be more compact.

In the example in Figure 2, the user enters a question and a program segment, and ChatGPT will answer and edit the source code.

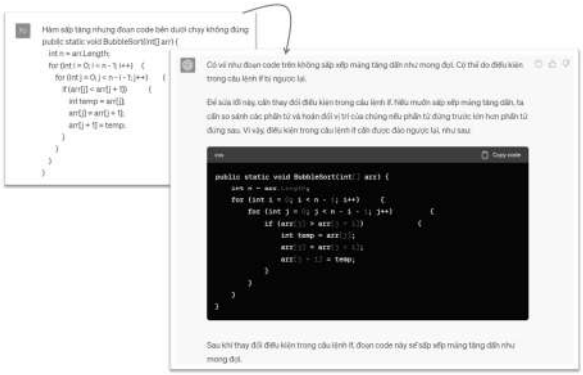


Figure 2. *Fixing the bugs*

In the above source code, there is a mistake by the programmer, so the program execution is only about to decrease, not increase as expected. ChatGPT detects this error and explains it in detail and then recommends more accurate source code.

An example is followed in Figure 3, giving ChatGPT a correct but not optimal program and the system has given the optimized source code very neatly and explained very clearly.

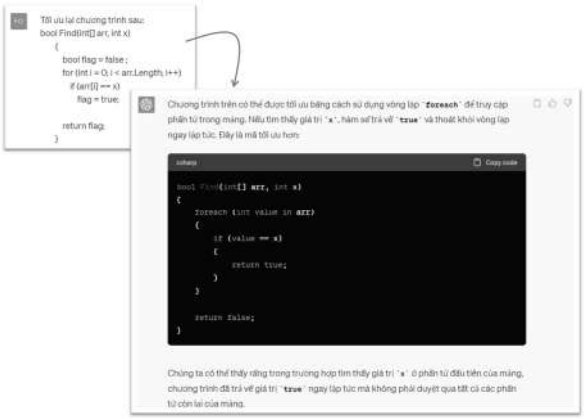


Figure 3. *Optimizing the source code.*

3.3 Writing the documentation

ChatGPT has the ability to read and understand source code and perform documentation writing for that source code. This is a very useful feature that saves a lot of time for programmers.

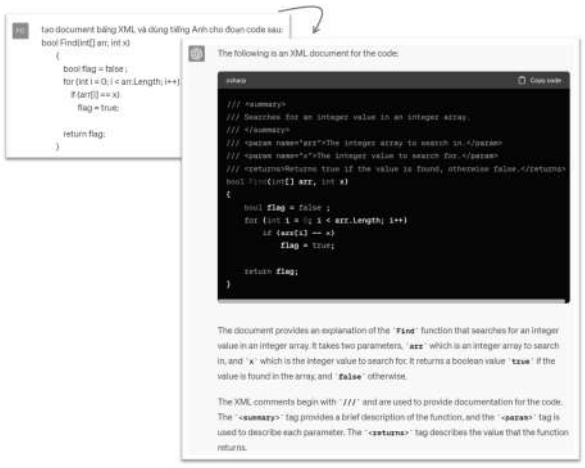


Figure 4. *Generating documentations*

For Visual Studio C#'s XML Documentation tool, only the framework can be generated, and the interpretation content must be filled in by the programmer. ChatGPT can parse and understand the source code and generate XML Documentation that describes the exact function and meaning of each component of the function in the above program.

3.4 Writing the test cases

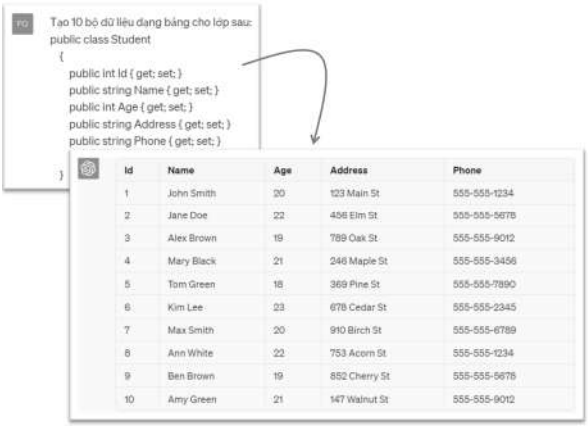
In the illustrative example (Figure 5), the user will ask the system to write a test case to find the error of the program segment. And the system specified the error and gave the test case of the error case.

Figure 5. *Test cases.*

It can be said that generating test cases for the program is a very necessary job in the program testing phase. This is also quite a time-consuming and labor-intensive job, so using ChatGPT can improve the efficiency of the testing phase of software development.

3.5 Creating sample data

When running a program test, the programmer needs some sample data to run and test the functions. ChatGPT can be used to generate data patterns based on the provided source code.



Id	Name	Age	Address	Phone
1	John Smith	20	123 Main St	555-555-1234
2	Jane Doe	22	456 Elm St	555-555-5678
3	Alex Brown	19	789 Oak St	555-555-9012
4	Mary Black	21	246 Maple St	555-555-3456
5	Tom Green	18	369 Pine St	555-555-7890
6	Kim Lee	23	678 Cedar St	555-555-2345
7	Max Smith	20	910 Birch St	555-555-6789
8	Ann White	22	753 Acorn St	555-555-1234
9	Ben Brown	19	852 Cherry St	555-555-5678
10	Amy Green	21	147 Walnut St	555-555-9012

Figure 6. *Sample data.*

Depending on the needs of using test data, the programmer can describe more details so that ChatGPT can create the test data set exactly as the programmer wants.

4. Some comments about using ChatGPT in programming

Some of the advantages of using ChatGPT in programming support are as follows:

1. Quickly support repetitive jobs, thereby saving programmers' time and effort.

2. With the ability to analyze and understand the program segment, ChatGPT can help improve the quality of the program through code improvement, debugging, and other suggestions for optimization.

3. Combining search and information synthesis intelligently, so it will help a lot in programming. Instead of using a regular search engine, you can use ChatGPT for more optimal results.

4. The ability to support all current programming languages is the strength of ChatGPT.

However, besides the advantages, the quality of the answer also depends on many factors, such as the complexity of the question, the way the question is asked, and the additional or guiding information. so that ChatGPT can quickly approach answering in the desired direction of the user. In addition, when receiving results from ChatGPT, programmers also need to add or adjust the content to be more complete, or more accurate to the requirements of the programmer.

5. Conclusion

In the article, we have presented the basic parts of the ChatGPT application, an artificial intelligence generator, that have been widely applied in recent times. This focus on introducing ChatGPT applications for programmers, these applications will help improve work efficiency and save programmers' time and effort. In the framework of the article, we have only presented the basic applications, and the tests are not many. In the future, we will continue to study deeply the applications of ChatGPT for different stages in the software development process.

References

1. https://en.wikipedia.org/wiki/ChatGPT. (Accessed 12/05/2023)
2. https://thanhnien.vn/ai-tao-sinh-cong-nghe-dung-sau-chatgpt-cua-openai-la-gi-185230323002545283.htm. (Accessed 11/05/2023)
3. https://openai.com/blog/chatgpt.
4. https://cult.honeypot.io/reads/how-can-chatgpt-help-developers/.(Accessed 11/05/2023)
5. https://www.pluralsight.com/blog/software-development/how-use-chatgpt-programming-coding. (Accessed 10/05/2023)
6. https://lablab.ai/t/chatgpt-tutorial-how-to-easily-improve-your-coding-skills-with-chatgpt. (Accessed 09/05/2023)
7. https://www.awesomescreenshot.com/blog/knowledge/chat-gpt-code.(Accessed 11/05/2023)
8. https://www.wikihow.com/Get-Chatgpt-to-Write-Code, (Accessed 11/05/2023)

UEF
UNIVERSITY OF ECONOMICS & FINANCE

QS STARS RATING SYSTEM

HUTECH
Đại học Công nghệ Tp.HCM

CỤC CÔNG TÁC PHÍA NAM

THE SECOND INTERNATIONAL CONFERENCE ON SCIENTIFIC, ECONOMIC AND SOCIAL ISSUES

DIGITAL TRANSFORMATION, COOPERATION AND GLOBAL INTEGRATION IN THE NEW NORMAL

FINANCIAL PUBLISHING HOUSE

TABLE OF CONTENT

APPLICATION OF TECHNOLOGY AND BIG DATA IN THE FIELDS OF FINANCE, ACCOUNTING AND AUDITING IN THE CONTEXT OF GLOBALIZATION

BANK RUN AND SILICON VALLEY BANK 1

Lam Dang Xuan Hoa, Ho Minh Khoa, Huynh Vo Nhat Linh 1

BIG DATA AND INTELLECTUAL PROPERTY RIGHTS 14

Le Thi Minh, Vo Trung Hau 14

THE EFFICIENCY OF THE INTERNAL CONTROL SYSTEM IN RISK MANAGEMENT AT THE NAM A COMMERCIAL JOINT STOCK BANK 23

Truong Thanh Loc, Tran Ngoc Thanh 23

VIETNAM - AUSTRALIA ECONOMIC AND TRADE COOPERATION IN THE NEW NORMAL: OPPORTUNITIES AND CHALLENGES FOR VIETNAMESE INVESTORS 30

Nhu Nguyen Phuc Quynh*, Anh Nguyen Thi Nguyet, Duy Nguyen Anh 30

IMPACTS OF CREDIT GROWTH AND CREDIT RISK ON THE PROFIT OF VIETNAM JOINT STOCK COMMERCIAL BANKS 43

Dao Le Kieu Oanh*, Tran Thi Huong Ngan 43

FACTORS AFFECTING CUSTOMERS' DECISIONS TO USE E-BANKING AT JOINT STOCK COMMERCIAL BANKS IN HO CHI MINH CITY 57

Nguyen Duy Khanh[1], Pham Quoc Tham[2] 57

HOW CHINA_USA POLITICAL TENSIONS AFFECT STOCK MARKET RETURN OF CHINA AND THE USA? A QUANTILE VAR CONNECTEDNESS APPROACH 70

Hao Wen Chang[1], Tsangyao Chang[2]and Mei-Chih Wang[3] 70

BANKING HUMAN RESOURCES BEFORE THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE AI 92

Nguyen Huynh Chi 92

IMPROVE THE QUALITY OF TRAINING THROUGH IMPROVEMENT OF STUDENT TESTING AND ASSESSMENT – CASE IN ACCOUNTING BRANCH, UNIVERSITY OF ECONOMICS AND FINANCE 102

Thuy Thi Ha 102

ACTIVITIES OF DIGITAL TRANSFORMATION IN VIETNAMESE COMMERCIAL BANKS: AN OVERVIEW DURING THE COVID-19 RECOVERY PERIOD 109

Nguyễn Thị Quỳnh Châu, Đào Lê Kiều Oanh 109

OPPORTUNITIES AND CHALLENGES FOR VIETNAM IN ATTRACTIVE FDI IN GLOBAL MINIMUM CORPORATE TAX IMPLEMENTATION 117

Ngo Hoang Thong 117

DIGITAL ECONOMY IN VIETNAM, TRENDS AND POTENTIABILITY

DEVELOPING SMART HOME MODEL FOR APARTMENTS IN HO CHI MINH CITY BASED ON INTERNET OF THINGS (IoT) TECHNOLOGY 182

Dang Thanh Thuy[1], Nguyen Thanh Dien[2] 182

TRANSPARENCY OF ACCOUNTING INFORMATION OF CONSTRUCTION ENTERPRISES IN HO CHI MINH CITY – CASE STUDY OF APPLICATION OF ACCRUAL ACCOUNTING....193

Truong Thanh Loc[1]*, Pham Thi Yen Nhi[2]....193

FACTORS AFFECTING THE QUALITY OF FINANCIAL STATEMENTS OF MANUFACTURING ENTERPRISES IN HO CHI MINH CITY 207

Truong Thanh Loc*, Dang Nguyen Tuong Han, Nguyen Ngoc Mai Phuong, Nguyen Thi Quynh Huong....207

THE CRITICAL FACTORS OF COLLEGE STUDENTS' INTENTION TO USE METAVERSE TECHNOLOGY FOR SUBJECTS RELATED TO IMPORT-EXPORT LEARNING....221

Van Thuy Nguyen Ho, Chau The Huu, Luan Thanh Nguyen*....221

CONSUMER PERCEPTION ABOUT THE SUSTAINABILITY COMMITMENT OF LUXURY BRANDS IN VIETNAM AND CHINA MARKETS....233

Tran Minh Tu[1]....233

INFLUENCE OF WOM AND EWOM IN MAKING DECISION BUYING GOODS 247

Doan Anh Tu[1], Kim Phi Rum[2], Nguyen Pham Hai Ha[3]....247

DIGITAL ECONOMY AND DEVELOPMENT POTENTIAL IN VIETNAM....257

Hoang Thi Chinh, Nguyen Hoang Phan 257

BLOCKCHAIN APPLICATION IN MODERN LOGISTICS: INTERNATIONAL EXPERIENCE AND SOME RECOMMENDATIONS FOR VIETNAM 266

Nguyen Nu Tuong Vi....266

FACTORS AFFECTING THE DEVELOPMENT OF THE DIGITAL ECONOMY IN VIETNAM 272

Vo Tien Si 272

LEGAL FRAME FOR THE OPERATION OF THE REAL ESTATE BUSINESS UTILIZING THE BLOCKCHAIN PLATFORM IN VIETNAM....284

Le Thi Khanh Linh....284

DIGITAL TRANSFORMATION – COOPERATION – GLOBAL INTEGRATION IN BUSINESS

FACTORS INFLUENCING BUSINESS ACCEPTANCE OF INDUSTRY 4.0 TECHNOLOGY APPLICATIONS IN DONG NAI PROVINCE 291

Thanh-Thu Vo*, Minh-Huong Tang 291

DIGITAL ORIENTATION, INNOVATION CAPABILITY AND FIRM PERFORMANCE: A PROPOSAL RESEARCH MODEL 298

Nguyen Van Hau 298

PREDICTION OF STUDENT'S BEHAVIORAL INTENTION TO USE SMART LEARNING ENVIRONMENT: A COMBINED MODEL OF SELF-DETERMINATION THEORY AND TECHNOLOGY ACCEPTANCE 309

Nguyen Thi Hai Binh[1], Dao Y Nhi[2], Nguyen Thanh Luan[3], Dang Quan Tri[4] 309

THE PEDAGOGICAL IMPACT OF GRAMMARLY ON EFL WRITING COMPETENCY: AN EMPIRICAL INVESTIGATION IN HIGHER EDUCATION CONTEXT. 323

Nguyen Thi Hong Lien[1], Nguyen Truong Gia Minh[2], Nguyen Ngoc Vu[3]* 323

FACTORS AFFECTING PURCHASING DECISION OF THE YOUTH ON TIKTOK 336

Ngoc Pham[1], Thanh Cong Tran* 336

FACTORS AFFECTING OCCUPATIONAL SAFETY BEHAVIORS OF WORKERS DIRECT PRODUCTION AT CU CHI POWER COMPANY 345

Minh Luan Le, Thi Trang Tran 345

CORPORATE SOCIAL RESPONSIBILITY AND EMPLOYEES' ORGANIZATIONAL CITIZENSHOP BEHAVIOUR 355

Nguyen Xuan Hung[1], Ha Le Thu Hoai[1], Nguyen Huu My Truc[2&3], Pham Tan Nhat[2&3] 355

THE INNOVATION CAPACITY - THE ROLE OF LEADERS OF SMALL AND MEDIUM ENTERPRISES IN HO CHI MINH CITY, VIETNAM 365

Huynh Nhut Nghia 365

PEOPLE'S THOUGHTS ON THE IMPACT OF ARTIFICIAL INTELLIGENCE ON BUSINESS 376

Ton Nguyen Trong Hien, Bui Tuyet Anh 376

FACTORS AFFECTING BRAND SWITCHING INTENTION IN THE CONTEXT OF HIGHER EDUCATION IN VIETNAM 382

Ly Dan Thanh, Nguyen Phu Quoi, Tran Hoang Nam, Vo Hong Son, Nguyen Ngoc Thuy Tien 382

ENHANCE THE DIGITAL COMPETITIVENESS 398

Tran Quang Canh, Hoang Thi Chinh 398

ASSESSING PATIENT SATISFACTION (BRAND) AFTER THE COVID-19 PANDEMIC AT THU DUC CITY HOSPITAL.....408

Nguyen Hoang Dung [1*], Nguyen Huynh Bao An [2], Van Phuong Trang [2] 408

INDUSTRIAL AND HUMAN RESOURCES FORM THE FOUNDATION FOR BINH DUONG'S SUSTAINABLE ECONOMIC DEVELOPMENT.....408

Hoang-An Nguyen 417

IMPACT OF ORGANIZATIONAL FAIRNESS ON THE EMPLOYEES' KNOWLEDGE SHARING IN TRAVEL AND TOURISM ENTERPRISES IN HO CHI MINH CITY 426

Le Thi Nhu Quynh[1,2], Le Thi Giang[2], Truong Quang Dung[1] 426

THE EFFECT OF PERSONAL MOTIVATION ON THE TACIT KNOWLEDGE SHARING BEHAVIOR OF 5-STAR HOTELS' EMPLOYEES IN HO CHI MINH CITY.....440

Le Thi Giang, Nguyen Bach Hoang Phung.....440

DIGITAL COMPETITIVENESS AND OPERATIONAL EFFICIENCY OF ENTERPRISES IN THE DIGITAL ERA: THE CASE OF VIETNAMESE ENTERPRISES 453

Diep Nguyen Thi Ngoc[1*], Canh Quang Tran[2], Anh Bach Hoang Ngoc[1].....453

FACTORS INFLUENCING PARENTS' SELECTION OF PRIVATE PRESCHOOLS IN THU DUC CITY 466

Thi-Trang Tran[1], Thi-My-Dung Pham[2], Thi-Bich-Diep Le[1*] 466

RECOVERY COMMUNICATIONS IN THE TOURISM AND HOSPITALITY INDUSTRY AFTER THE COVID-19 PANDEMIC

DEVELOPING A SPIRITUAL TOURISM DESTINATION IMAGE MEASUREMENT SCALE OF AN GIANG 474

Nguyen Vuong Hoai Thao[1], Nguyen Quyet Thang[2] 474

PROSPECTS OF VIRTUAL REALITY TOURISM APPLICATION IN VIETNAM TOURISM PROMOTION 487

Nguyen Thi Hong Ha, Pham Thi Huong Giang 487

PERSONALIZATION TRAVEL TRENDING IN HO CHI MINH CITY IN THE CONTEXT OF POST COVID-19 497

Duong Bao Trung 497

IMPACTS OF MEDIA ON CUSTOMERS' DECISION TO CHOOSE FOOD AND BEVERAGE SERVICES POST THE COVID-19 PANDEMIC 511

Nguyen Thi Bich Van 511

DIGITAL TRANSFORMATION APPLICATION TO PROMOTE THE RECOVERY AND DEVELOPMENT OF INBOUND TOURISM IN HO CHI MINH CITY 521

Tran Trong Thanh 521

VIETNAM TOURISM AFTER COVID-19 PANDEMIC 527

Nguyen Hoang Phan[1], Hoang Thi Chinh[2] 527

NAVIGATING THE EVOLVING LANDSCAPE OF SOCIAL MEDIA DATA MINING AND PRIVACY 537

Pham Thai Hien 537

THE CORRELATION BETWEEN STUDENT SELF-REPORTED GENERAL WELL-BEING AND PERCEIVED SUPPORT FROM FRIENDS, TEACHERS, AND UNIVERSITY 545

Virginia Kelsey[1], Đặng Thị Mai Ly[2*], Nguyễn Anh Khoa[2], Nguyễn Văn Tường[2] 545

DIGITAL VERSUS NON- DIGITAL

PROVIDING CONVENIENCE TO CUSTOMERS IN THE DIGITAL MARKETING ERA: OBSERVATIONS FROM COMMERCIAL BANKS IN HO CHI MINH CITY 556

Nguyen Quang Trung 556

VIRTUAL REALITY: AN INNOVATIVE TOOL IN TOURISM EXPERIENTIAL MARKETING 564

Thanh Nguyen Ngoc Le[1], Khuong Thanh Nguyen[2] 564

THEORETICAL CONCEPTS OF STRATEGIC POSITIONING FOR PLACE BRANDING: A CASE STUDY OF DONG THAP PROVINCE 580

Phan Bao Giang.....580

LITERATURE REVIEW ON THE IMPACT OF DIGITAL MARKETING ON VIETNAM'S SMALL AND THE MEDIUM BUSINESS ENTERPRISES (SMEs) 587

Lê Kim Nguyên[*] 587

CHALLENGES FACED BY TEACHERS IN NON-TRADITIONAL EDUCATION

PROPOSE AN ONLINE TEACHING COMPETENCE SCALE FOR UNIVERSITY LECTURERS 596

Duong Thi Kim Oanh*, Dang Thi Dieu Hien 596

EXAMINE USAGE OF LEARNING MANAGEMENT SYSTEMS (LMSS) BY FACULTY STAFF AT UNIVERSITY OF ECONOMICS (UEF) AND FINANCE WITH EXPANDED TECHNOLOGY ACCEPTANCE MODEL (TAM).....608

Ha Truong Minh Hieu, Ngo Minh Hai*, Mach Tran Huy.....608

DIGITAL TRANSFORMATION
AN INDISPENSABLE EVOLUTION FOR SUSTAINABLE CORPORATES

FACTORS AFFECTING THE APPLICATION OF STRATEGIC MANAGEMENT ACCOUNTING AT MANUFACTURING ENTERPRISES IN BINH DUONG PROVINCE 618

Truong Thanh Loc[1]*, Nguyen Thi Thanh Truc[2] 618

HRM DIGITAL TRANSFORMATION: TAKING A ROAD OF SUCCESSION PLANNING ..629

Trương Phan Hoàng Anh, Giang Ngọc Anh.....629

THE IMPLICATION OF CONTACLESS SERVICE AS A TOOL TO IMPROVE CUSTOMER REVISIT INTENTION 640

Linh, Nguyen Duy Yen*.....640

TOURISM BRAND LOVE IN THE DIGITAL AGE: THE ROLE OF ONLINE TOURIST EXPERIENCES, TOURIST-BRAND RELATIONSHIP QUALITY AND SUSTAINABILITY 651

Thanh Nguyen Ngoc Le 651

CONDUCTING FOCUS GROUPS IN CROSS-CULTURAL SCHOLARSHIP OF TEACHING AND LEARNING (SoTL): A COMPARATIVE CASE STUDY 662

Punithan Moganathas[1], Jenny Hill[2], Andy V.-M. Kok[2], Matt Barr[2], Ruffin Relja[2]*, Philippa Ward[2], Duong Tran Quang Hoang[3], Quynh Phuong Tran[3] 662

LEVERAGING DIGITAL TRANSFORMATION FOR SUSTAINABLE CORPORATE EVOLUTION IN VIETNAM 677

Nguyen,Tan Dat[1], Le,Dinh Thang[2].....677

INFORMATION TECHNOLOGY AND APPLICATIONS

FB-PROPHET MODEL FOR TIME SERIES FORECASTING IN SALES 691
Thanh Cong Tran 691
USING AI CODE IN C# PROGRAMMING 698
Nguyen Ha Giang 698
DETERMINANTS OF CONTINUANCE USAGE INTENTION OF MOBILE FOOD ORDERING APPLICATIONS (MFOAS) AMONG VIETNAMESE USERS: THE MEDIATING ROLE OF E-SATISFACTION 705
Lam Hoang Phuong[1*], Nguyen Thi Kim Lien[2], Tien Hung Nguyen[3], Vinh Long Nguyen[4] 705
DECODING MARKETING INSIGHT: INSIGHT FROM OUTSIDE 718
Hoàng Thị Hằng, Trần Thành Công[*] 718
DIGITAL DISRUPTION AND DATA SECURITY: HOW FINTECH IS RESHAPING BANKING 724
Hoàng Văn Hiếu, Trần Ngọc Thiên Ngân 724

TRENDS AND ISSUES IN ENGLISH LANGUAGE EDUCATION AND RESEARCH

EFL LEARNERS' ATTITUDES AND LEARNING ENGAGEMENT IN COMMUNICATIVE GAME-BASED GRAMMAR TEACHING 736

Nguyen Thi Thanh Huyen[1], Tran Quoc Thao[2] 736

APPROACHES TO TEACHING L2 LISTENING: 749

CLOSING THE GAP BETWEEN REAL-LIFE AND CLASSROOM-BASED LISTENING 749

Luu Thi Mai Vy 749

DEFINING ROLES OF STUDENT ENGAGEMENT IN THE 21ST CENTURY LANGUAGE CLASSROOM 755

Ho Xuan Tien, Duong My Tham 755

EFL STUDENTS' ATTITUDES AND LEARNING INVESTMENT IN PORTFOLIO - BASED ENGLISH WRITING LEARNING: A LITERATURE REVIEW 763

Ly Gia Huy[1], Tran Quoc Thao[2] 763

EXPLORING EFL LEARNER IDENTITIES IN PROJECT-BASED LANGUAGE LEARNING AT A HIGH SCHOOL IN AN GIANG PROVINCE 774

Nguyen Hong Thien[1], Tran Quoc Thao[2] 774

THE VALUES OF SYNTACTIC COMPLEXITY IN ACADEMIC WRITING: A LITERATURE REVIEW 791

THE ISSUE OF AMBIGUITY IN THE ENGLISH LANGUAGE 801

Nguyen Dinh Tuan 801

RESEARCH PERSPECTIVES ON JUNIOR HIGH SCHOOL EFL STUDENTS' MOTIVATION IN ENGLISH LANGUAGE LEARNING 812

Huynh Thanh Nhon[1], Tran Quoc Thao[2] 812

EXPLORING THE INFLUENCE OF WRITING ANXIETY ON VIETNAMESE ESL UNDERGRADUATES' WRITING PERFORMANCE: A QUANTITATIVE STUDY 821

Nguyen Ngoc Nguyen, Nguyen Hoang Phan 821

THE APPLICATION OF THE "FLIPPED CLASSROOM" MODEL IN TEACHING ENGLISH IN THE VIETNAMESE UNIVIVERSITY EDUCATION ENVIRONMENT 838

THE USE OF RESOURCE MANAGEMENT STRATEGIES IN EFLFLIPPED CLASSROOMS 847

Nguyen Quynh Thao Vy[1,*], Duong My Tham[2] 847

INSIGHTS INTO ENGLISH MAJOR STUDENTS' USE OF PHRASAL VERBS IN ACADEMIC WRITING 860

Do Thi Thanh Thuy, Tran Quoc Thao 860

LAW IN THE CONTEXT OF INTERNATIONAL INTEGRATION

LEGALISING INTELLECTUAL PROPERTY INFRINGEMENTS IN RUSSIA – A WAR TACTIC IN THE CONTEXT OF RUSSIA'S INVASION OF UKRAINE 869

Bui Thi Hong Ninh* 869

MODEL OF ASSET REGISTRATION WORLDWIDE AND LESSONS FOR VIETNAM IN IMPROVING ASSET REGISTRATION LAWS 880

Vu Anh Sao[1,2], Nguyen Thi Xuan Mai[2] 880

LEGAL ISSUES ARISING FROM THE DEVELOPMENT, IMPLEMENTATION, AND USE OF ARTIFICIAL INTELLIGENCE (AI) - INTERNATIONAL EXPERIENCES AND LESSONS FOR VIETNAM 887

Le Hoang Minh Huy*, Nguyen Thi Thu Ha, Dao Trong Duc, Ky Dieu Linh, Bui Thi Thuy Linh, Nguyen Nam Trung 887

SOUTH KOREA'S EXPERIENCES ON PROPERTY REGISTRATION LAW - LESSONS FOR VIETNAM 896

Vu Anh Sao, Pham Huynh Bao Oanh 896

THE RISE OF REMOTE WORK: LEGAL CHALLENGES AND IMPLICATIONS FOR EMPLOYMENT LAW IN VIETNAM 903

Nguyen Thi Xuan Mai[1], Nguyen Thi Ngoc Loan[2] 903

CHALLENGES AND RECOMMENDATIONS FOR THE LEGAL FRAMEWORK IN THE EMERGING AGE OF ARTIFICIAL INTELLIGENCE 910

Nguyen Thi Thu Trang 910

THE IMPACTS OF GLOBAL MINIMUM TAX ON FOREIGN DIRECT INVESTMENT (FDI) CORPORATIONS IN VIETNAM 921

Trần Ngọc Thanh[1] 921

CROSS-BORDER E-COMMERCE ACTIVITIES AND TAX MANAGEMENT ISSUES 933

Le Huynh Phuong Chinh, Ngo Thi Khanh Linh, Pham Ngoc Lan Anh 933

EXPERIENCE IN KOREA AND CHINA ON TAX MANAGEMENT FOR CROSS-BORDER E-COMMERCE ACTIVITIES 941

Duong Anh Son[1], Tran Vang Phu[2] 941

LEGAL PERSPECTIVE ON REGULATIONS RALATED TO PERSONAL INCOME TAX WHEN EARNING INCOME THROUGH E-COMMERCE PLATFORMS IN VIETNAM, TAKING THE CASE OF INDIVIDUALS DOING BUSINESS THROUGH TIKTOK APPLICATION 946

Nguyen Duc Tri [1], Hoang Minh Châu[2] 946

THE COMPATIBILITY ON THE SCOPE OF MUTUAL LEGAL ASSISTANCE (MLA) IN CRIMINAL MATTERS AND THE CONDITIONS OF REFUSAL MLA IN CRIMINAL MATTERS BETWEEN VIETNAMESE LAW AND INTERNATIONAL TREATIES WHICH VIETNAM HAS SIGNED. 956

Pham Huynh Bao Oanh 956

TAX POLICY FOR E-COMMERCE OF COUNTRIES IN THE WORLD AND RECOMMENDATIONS TO VIETNAM 967

Nguyen Thanh Minh Chanh, Ha Thi Van Anh, Pham Lam Tam Nhu 967

LEGAL REGULATIONS FOR ENTERPRISE OBLIGATIONS TO PROVIDE INFORMATION ON E-COMMERCE PLATFORM 974

Truong Kim Phung*, Nguyen Hoang Chuong 974

"ROBOT TAX" – RECOMMENDATIONS FOR VIETNAM 981

Gian Thi Le Na, Pham Phuong Doanh 981

WTO APPELLATE BODY REFORM IN THE CONTEXT OF ESCALATING GEOPOLITICAL TENSIONS 988

Nguyen Nam Trung 988

IMPACTS OF STATE OWNERSHIP AND BUSINESS CHARACTERISTICS ON TAX AVOIDANCE: EVIDENCE IN VIETNAM....128
Huyen Ngoc Nguyen, Thanh Dan Bui 128
RUSSIA'S IMPACTS AND SCENES ON BEING BANNED FROM SWIFT....143
Lam Dang Xuan Hoa [1] , Phan Ngoc Anh [2] 143
THE ROLE OF ACCESS TO FINANCE AND THE ENTREPRENEURIAL INTENTION OF YOUNGERS IN THE SOUTHWESTERN PROVINCE, VIETNAM....151
Vu Truc Phuc*, Nguyen Dang Hat, Nguyen An Phu, Dao Le Kieu Oanh 151

9. https://medium.com/@tanyamarleytsui/coding-with-chatgpt-b50ab3fcb45f. (Accessed 11/05/2023)
10. https://legiit.com/blog/chat-gpt-code. (Accessed 11/05/2023).

NOT FOR SALE

ISBN: 978-604-79-3782-0

HO CHI MINH CITY UNIVERSITY OF ECONOMICS AND FINANCE

141 - 145 Dien Bien Phu, Ward 15, Binh Thanh District, HCM City

Website: uef.edu.vn - Hotline: (028) 5422 6666 * (028) 5422 5555