Future directions:

one of Artificial Intelligence's most intriguing and rapidly expanding approaches is Deep learning. Deep learning models are distinguished from other machine learning approaches by their ability to autonomously discover patterns from data. A substantial percentage of recent AI advancements may be attributed to deep learning. Deep learning models, on the other hand, are extremely dependent on the underlying data. In recent years, social media-based stocks have become very famous among youngsters, it has even attracted others too. The survey points out that families that invest in social media-related equities have more leveraged balance sheets. If these social-media stocks fall or if the people who own them quit investing in them, the market will become extremely volatile. Due to non-stationary, noisy, and chaotic data, the stock market prediction is a huge issue, and as a result, investors find it difficult to invest their money for profit. Several strategies for predicting stock market movements have been created in recent years. But most of them don’t focus on the external factors which influence the stock market.

These external factors have more impact on the fluctuation of stock market price, for example, non-economic variables such as natural disasters and political actions affect stock market data, making it naturally noisy and unpredictable. The unpredictability of stock data is also related to the lack of accurate knowledge of the stock market's historical behavior, which makes it difficult to capture the relationship between future and prior values. The lack of accurate knowledge about the stock market makes predicting a stock's future price difficult.

The stock market major problem faced is the nature of the stocks, high frequency, non-linear, and chaotic data make it hard for the researchers to predict them. Not only that, but the availability of data has also become a problem too, it's impossible to feed a deep learning system with every potential labelled sample in a problem area. Even though historic data plays a vital role in stock market prediction, sometimes data availability affects the prediction. One of the challenging tasks of Deep Learning is the need to give excellent results with a little amount of training data. Exploring a wide range of data inputs can be a way to improve the prediction model, even more accurately.

In the line of exploring data inputs considering sentiment analysis is a new trend in stock market prediction. Sentiment analysis can be performed and the generated sentiment factor (e.g., positive, neutral, or negative) can be used by the model for prediction, these provide more important information which can’t be found in the market data. Sentiment analysis is most commonly done using Twitter data, even user comments related to stocks or even from social media can be used, reviews and surveys can also be used.

In the line of exploring data inputs, even considering features from enterprise association networking information, industry background, shareholder structure, initial public offering (IPO) positioning can bring a different point of view in the near future. The success of CNN in image processing and recognition, have led few researchers to predict stock market trend using an image as input data. Considering different formats of images as input, many other types of images can be generated in the image creation phase, such as bull patterns and 3D images. Lee et al has paved the way for large-scale time-series data, which is based on structured numerical data. To increase predicting performance, future research might construct a multi-modular model incorporating inputs from large-scale unstructured and structured time-series data.

Even considering other external factors which influence the stock market is also nearly important in stock market prediction. Considering external factors has shown the power of increasing the accuracy in the prediction models. We can further learn in-depth about the effectiveness of these external factors, by trying across different sectors or even different individual stocks in the same sector. Even considering different time intervals for the external factors can also be a big difference in the study. Many researchers have considered the influence of other developed stock markets over the developing stock market, influence of oil price change, investors sentiment, etc for predicting the stock trend. Considering the political situation of a nation that is not politically stable can be a different point of view in prediction strategy.

As we spoke earlier, regarding external factors, considering the correlation between stocks is also an external factor that influences the stock market. The related stocks can influence the trend of the target stock which has been proved in many research studies. To take this point of view even wider, considering the correlation among stocks, forex, commodities, bond, would be more interesting to investigate whether and how they are correlated with stock market movement or trend.

Even though the data input and variety of source are important, on other hand, the model’s parameters which is also one of the reasons for the model’s prediction accuracy. Those parameters needed to be mainly adjusted to make the results more accurate or even optimized. There are few studies, where optimization algorithms are used to optimize the parameters to best suit the model. Even considering heuristics, metaheuristics, or hybrid algorithms for feature selection and parameter optimization is one of the future directions, where the metaheuristic algorithms such as particle swarm optimization (PSO), firefly algorithm (FA), and differential evolution (DE) can be utilized to optimize the parameters of the model. Recently multi-layer hybrid models are in the trend, as Hamid et al. suggested that possible future works can be conducted in the line of multi-layered CNN and LSTM models with hidden units and the possibility of improving the algorithms.