Batch: C2 Roll No.: 110

Experiment / assignment / tutorial No. 8

Title: IEEE Case study on learning/planning techniques

Objective: Case study on AI System (learning/planning techniques) based paper published in IEEE/ACM/Springer

Expected Outcome of Experiment:

Course Outcome	After successful completion of the course students should be able to
CO4	Analyse applications of AI and understand planning & learning processes in advanced AI applications

Books/ Journals/ Websites referred:

Pre Lab/ Prior Concepts:

A learning agent is **a tool in AI that is capable of learning from its experiences**. It starts with some basic knowledge and is then able to act and adapt autonomously, through learning, to improve its own performance.

Artificial intelligence is an important technology in the future. Whether it is intelligent robots, self-driving cars, or smart cities, they will all use different aspects of artificial intelligence!!! But Planning is very important to make any such AI project.

Even Planning is an important part of Artificial Intelligence which deals with the tasks and domains of a particular problem. Planning is considered the logical side of acting.

Everything we humans do is with a definite goal in mind, and all our actions are oriented towards achieving our goal. Similarly, Planning is also done for Artificial Intelligence.

For example, Planning is required to reach a particular destination. It is necessary to find the best route in Planning, but the tasks to be done at a particular time and why they are done are also very important.

Note: A minimum of two papers should be selected based on the AI application of learning or planning concepts and summarized as follows.

Title : A Framework of an Agent Planning with Reinforcement Learning for E-Pet

Abstract of the paper E-pet is an animal-type robot companions, he can be physical or electronic. Reinforcement learning (RL) can be applied to the e-pet. However, the interactive instruction is constituted by complex activities. In this study, we proposed a framework that integrated AI planning technology into RL to generate the solution. In the framework, the e-pet interacts with human and includes two components: environment and agent. The agent exploits AI planning to seek goal state and Markov decision process (MDP) to choose the action and updates each Q-value using Q-learning algorithm. And we proposed the three-level subsumption architecture which including instinct level, perception level, and planning level. We build layers corresponding to each level of competence and can simply add a new layer to an existing set to move to the next higher level of overall competence. We implement the e-pet in a 3D model and train the agent. Experimental result shows that the update of Qtable reduces the number of planning states in the framework.

Proposed Architecture / System

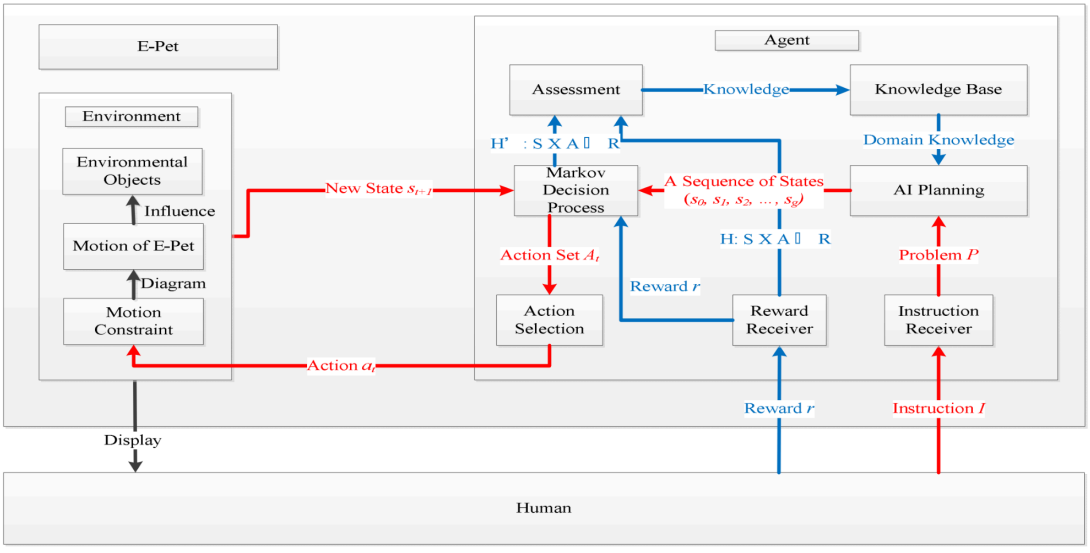

Fig. 2. *The framework of an agent planning with reinforcement learning for e-pet.*

The architecture has three layers Instinct Level, Perception Level, and planning level.

Results Seven instructions used to train the e-pet, including circle,run, up, sit, down, lie, and come. Each instruction trains 60 times. The training finished when performing an action to goal state and the probability of the action bigger than 50%. Figure 7

shows the experimental result. The x-axis represents training times, and the y-axis represent the amount of actions to achieve goal state. The experimental result shows that the amount of actions was decreased because together the Markov decision process module and action selection module are sufficient for the agent to seek hidden transition taking action aij from state si to state sj skipping middle state(s)

Conclusion

We proposed a framework that integrated AI planning technology into RL to generate the solution. The agent exploits AI planning to seek goal state and Markov decision process (MDP) to choose the action and updates each Q-value using Q-learning algorithm. We also proposed the three-level subsumption architecture which including instinct level, perception level, and planning level. We implement the e-pet in a 3D model and train the agent.

Title : Stock Market Prediction Using AI

Abstract of the paper AI stock market prediction requires processing a lot of data and making predictions based on that analysis, which is a challenging task. By analyzing data from a variety of sources, including news stories, earnings reports, and social media, AI techniques like machine learning algorithms and natural language processing can help discover trends and forecast changes in the stock market. It is crucial to keep in mind, though, that numerous unknown events have an impact on the stock market. For investors, forecasting is highly challenging to make it more profits because of the noisy and dynamic data. It is advised to employ AI predictions as one of several inputs in a well-diversified investment plan to attain accurate stock market predictions. The most recent stock market-related forecast methodology, despite considerable effort, contains major flaws. It makes sense to assume that this study's stock prediction is the result of an integrated process.

Proposed Architecture / System

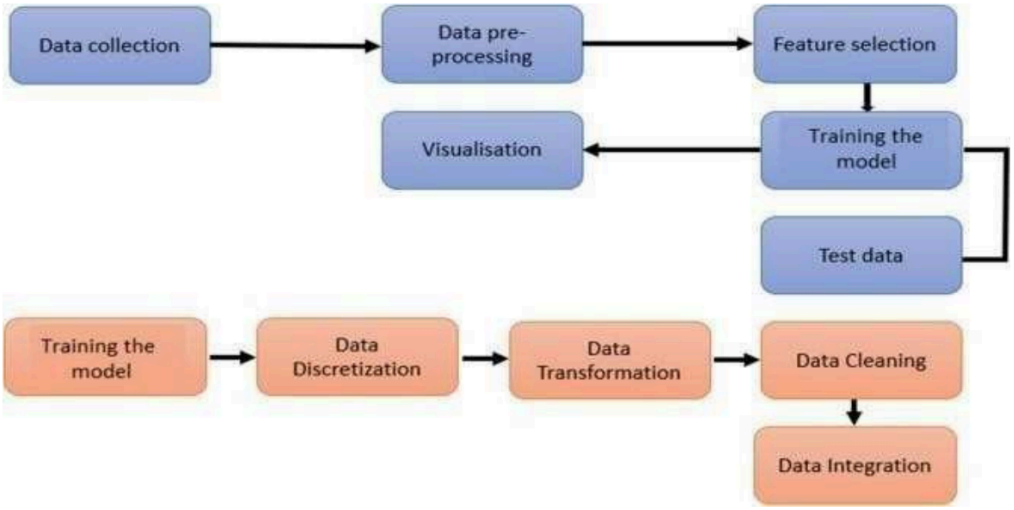

Fig. 2. Block diagram of proposed methodology

Step 1: Data Collection
Using web scraping, historical data is gathered.
Step 2: Data Pre-processing
2.1. Data discretization: Data reduction
2.2. Data transformation: Normalization
2.3. Data cleaning: Fill in the missing values
2.4. Data integration: Integration of data files
Step 3: Feature Extraction
Necessary features from date, open, high, low, close and volume are chosen.

Results

Fig. 3. Actual vs Predicted values using Linear Regression

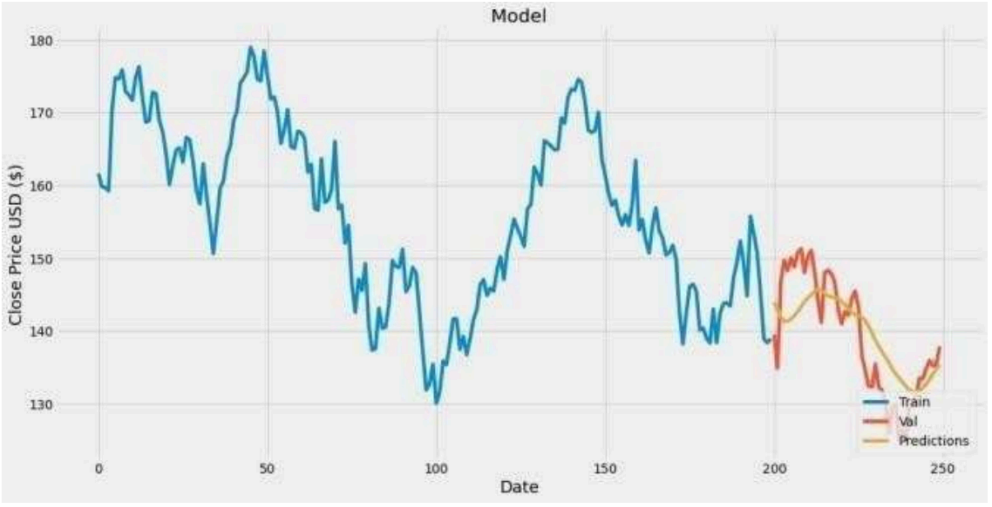

Fig. 4. Actual vs Predicted values using LSTM

Above 85% accuracy obtained

Conclusion

The work demonstrated the potential use of machine learning in analysing the stock market based on the company name, previous price, and current prices. The accuracy of the predictions is above 85 percent. This survey's goal is to categorize current methodologies for using different datasets, performance matrices, and applying

techniques. It makes use of 30 research articles from the most prestigious journals. The stock market prediction techniques are categorized using various ML algorithms. To improve prediction accuracy, some of the selected studies use hybrid methods in the stock market. The most critical step in forecasting stock markets is that the stock market is volatile. The market goes up and down and it's not always easy to predict. The dropping prices are affected because of the imbalance between supply and demand, interest rates, political factors, natural calamities, and inflation.

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