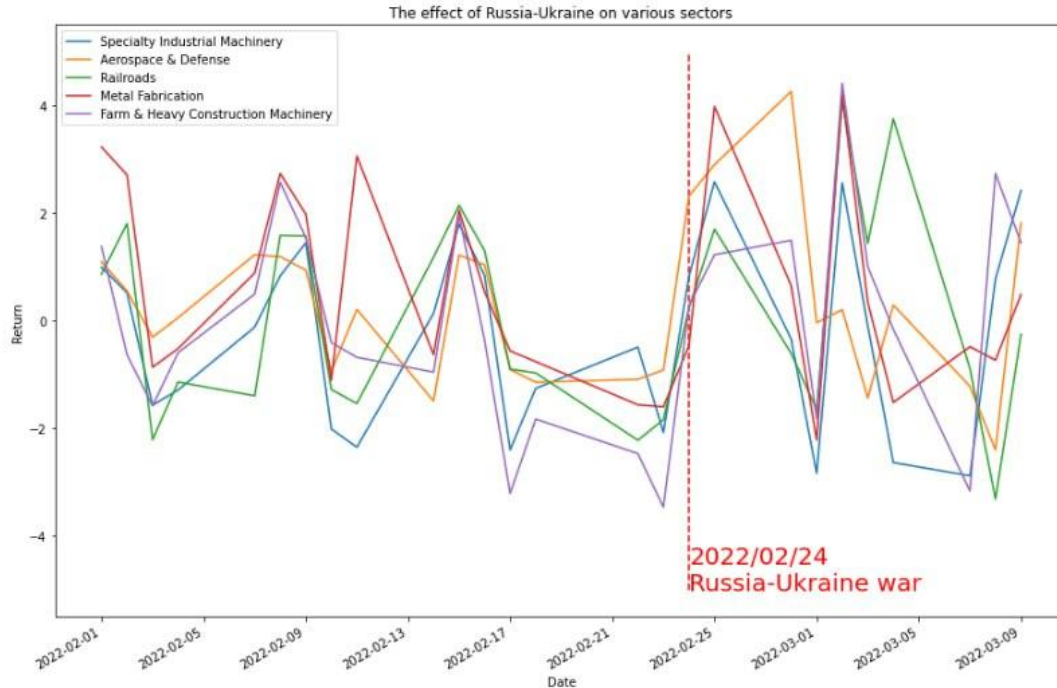# Stock Price prediction of Defense companies based on conflict index

Group 1- Shayaun Bashar, Lang Ye, Qiuyi Yang, Paniz Kabirpour

# Motivation - What are the sectors may be involved in War?

=> An increase in provider companies was followed by a subsequent rise in stock price of Aerospace and defence companies
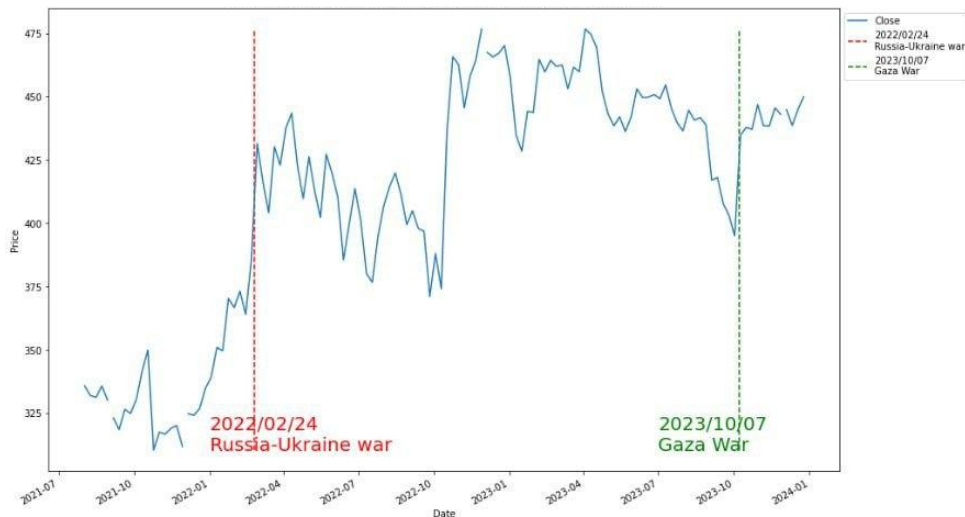


The effect of Russia-Ukraine on various sectors

**Possible reason for the initial rise in providers companies:**

Negative public perception and sentiment surrounding these companies

# Motivation - Aerospace and Defence

=> Comparing the Stock price of a **Defence Company** (LMC) and **S&P 500** (a stock market index tracking the stock performance of 500 of the largest companies listed on stock exchanges in the United States) **between two recent wars:**



The effect of Russia-Ukraine and Gaza War on *Lockheed Martin Corporation*
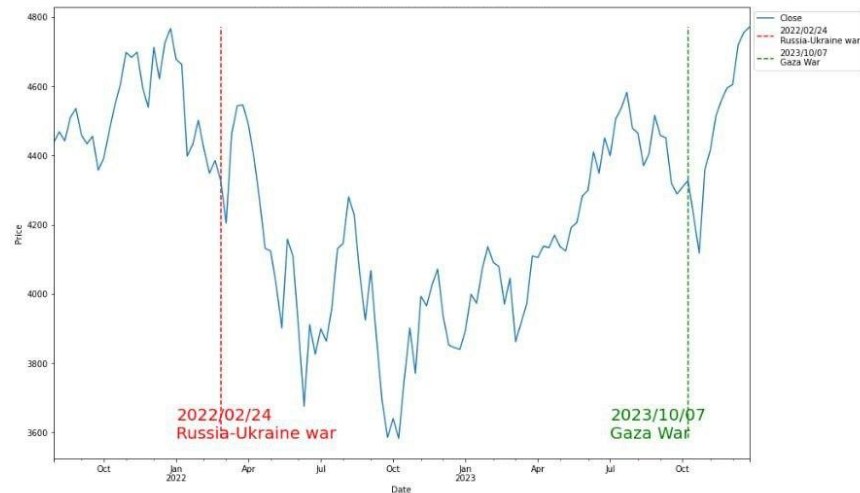


The effect of Russia-Ukraine and Gaza War on *S&P 500*

# Motivation

- Can escalating global tensions serve as a reliable predictor for the stock prices of defensive companies?

- How does the correlation between rising conflict levels and defensive company stock prices offer strategic insights for investors?

- Why might understanding the relationship between conflict escalation and defensive stock prices lead to more informed investment decisions?
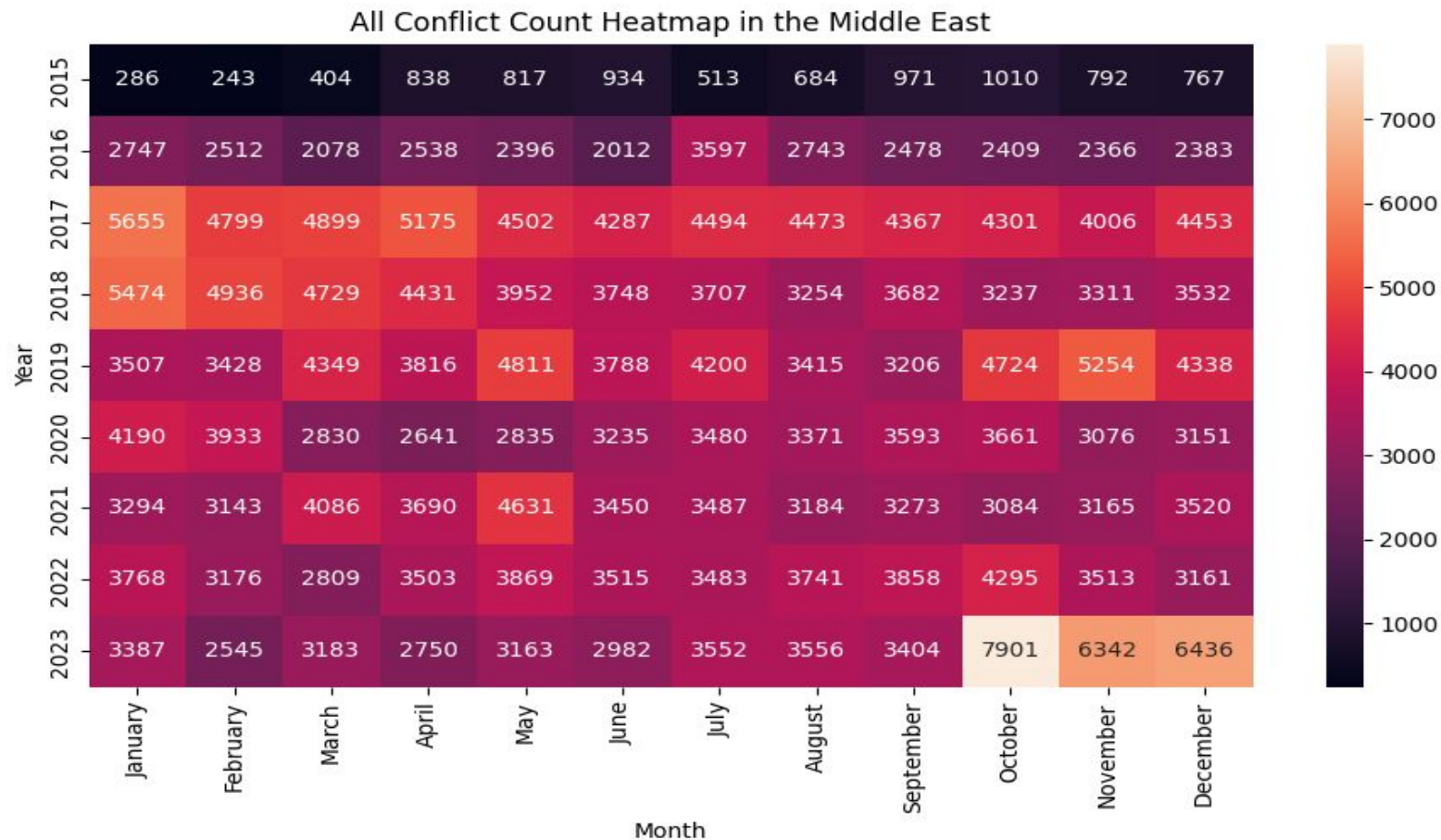
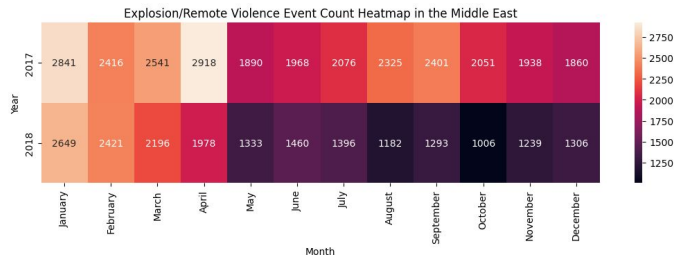# Working Process- Obtaining Data

**Data Collection from Yahoo Finance:**

- To analyze the impact of war on stock prices, data is required from the Yahoo Finance website.
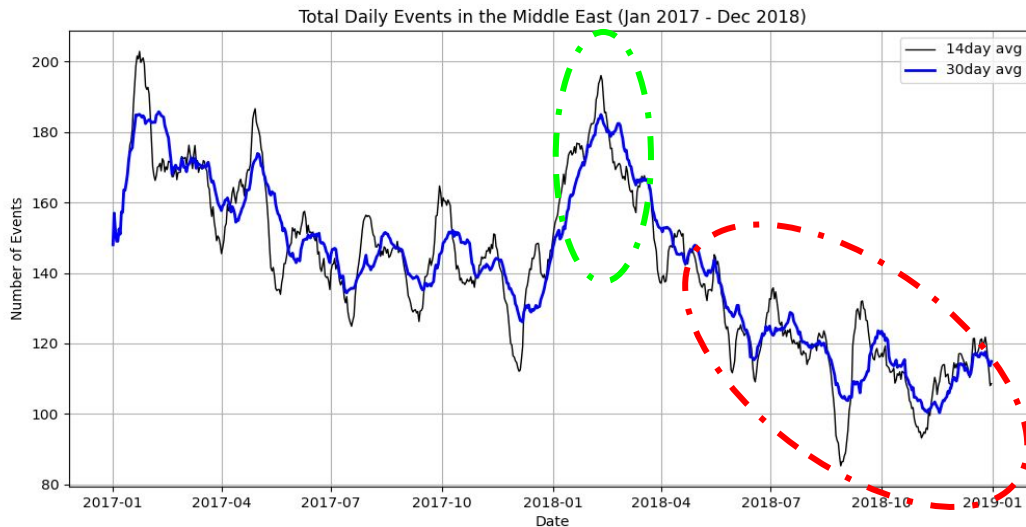
**ACLED Conflict Index:**

- Provides regional event data categorized by different event markers like Explosions/Remote Violence, Violence against civilians and Battles.

All Conflict Count Heatmap in the Middle East

| Year | January | February | March | April | May | June | July | August | September | October | November | December |
|------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| 2015 | 286 | 243 | 404 | 838 | 817 | 934 | 513 | 684 | 971 | 1010 | 792 | 767 |
| 2016 | 2747 | 2512 | 2078 | 2538 | 2396 | 2012 | 3597 | 2743 | 2478 | 2409 | 2366 | 2383 |
| 2017 | 5655 | 4799 | 4899 | 5175 | 4502 | 4287 | 4494 | 4473 | 4367 | 4301 | 4006 | 4453 |
| 2018 | 5474 | 4936 | 4729 | 4431 | 3952 | 3748 | 3707 | 3254 | 3682 | 3237 | 3311 | 3532 |
| 2019 | 3507 | 3428 | 4349 | 3816 | 4811 | 3788 | 4200 | 3415 | 3206 | 4724 | 5254 | 4338 |
| 2020 | 4190 | 3933 | 2830 | 2641 | 2835 | 3235 | 3480 | 3371 | 3593 | 3661 | 3076 | 3151 |
| 2021 | 3294 | 3143 | 4086 | 3690 | 4631 | 3450 | 3487 | 3184 | 3273 | 3084 | 3165 | 3520 |
| 2022 | 3768 | 3176 | 2809 | 3503 | 3869 | 3515 | 3483 | 3741 | 3858 | 4295 | 3513 | 3161 |
| 2023 | 3387 | 2545 | 3183 | 2750 | 3163 | 2982 | 3552 | 3556 | 3404 | 7901 | 6342 | 6436 |

# Stock Prediction using Conflict Index



Explosion/Remote Violence Event Count Heatmap in the Middle East
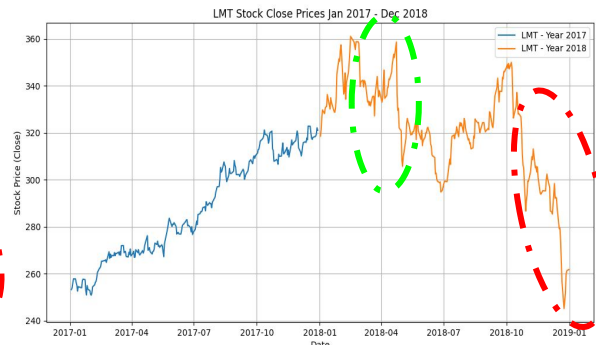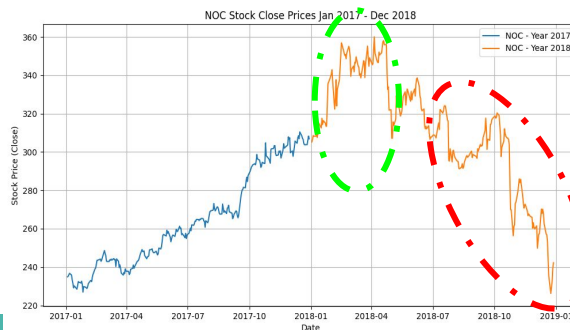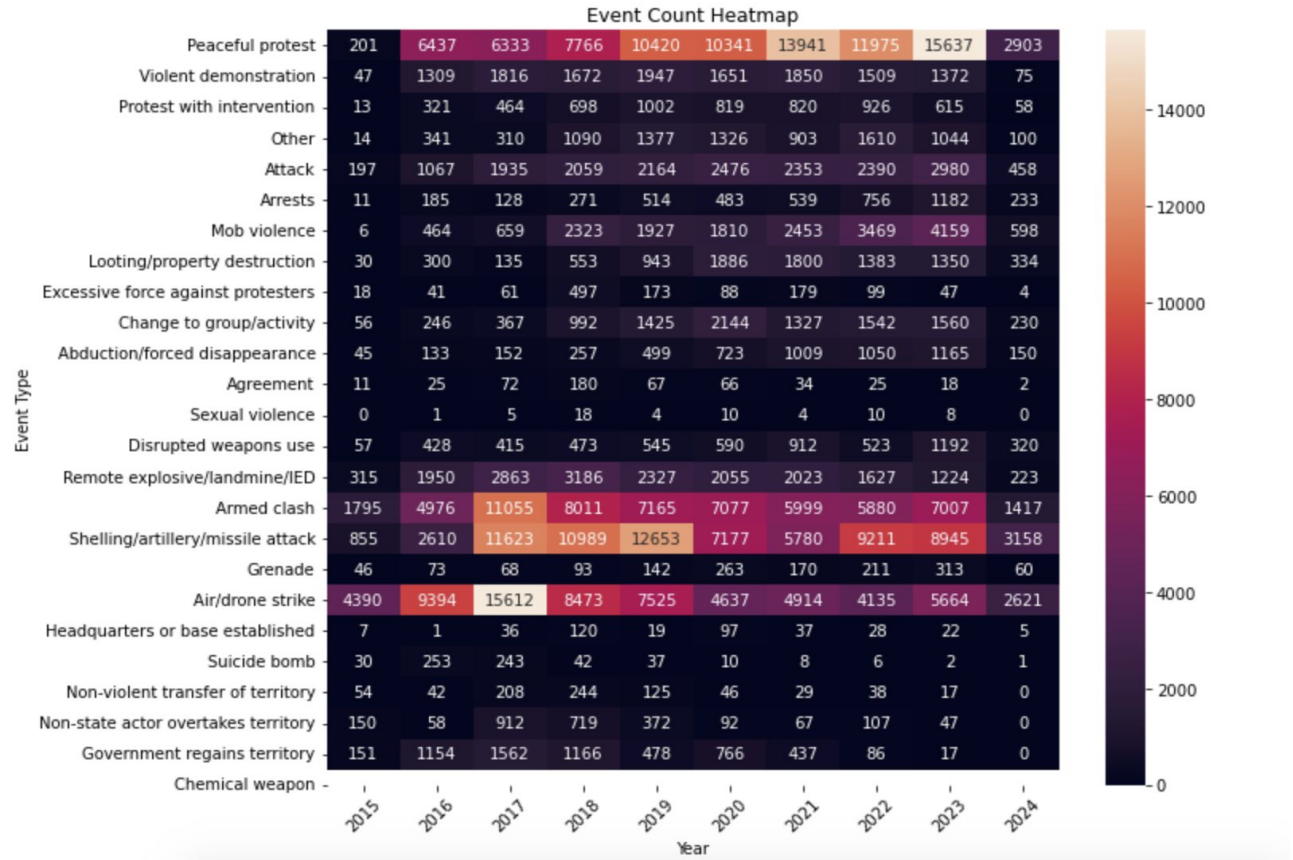
We can see that trends from the total conflict events per day can predict rising/decreasing stock prices.



Total Daily Events in the Middle East (Jan 2017 - Dec 2018)



RTX Stock Close Prices Jan 2017 - Dec 2018



NOC Stock Close Prices Jan 2017 - Dec 2018



LMT Stock Close Prices Jan 2017 - Dec 2018

# Type of Violence and count in Middle East

Amount these type of event, we will try to find out which type will have influence in the stock price



## Event Count Heatmap

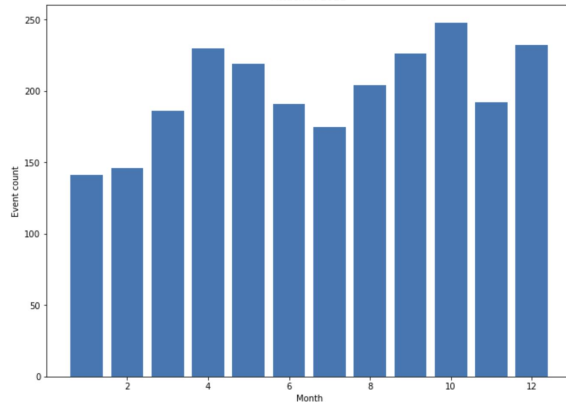| Event Type | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| Peaceful protest | 201 | 6437 | 6333 | 7766 | 10420 | 10341 | 13941 | 11975 | 15637 | 2903 |
| Violent demonstration | 47 | 1309 | 1816 | 1672 | 1947 | 1651 | 1850 | 1509 | 1372 | 75 |
| Protest with intervention | 13 | 321 | 464 | 698 | 1002 | 819 | 820 | 926 | 615 | 58 |
| Other | 14 | 341 | 310 | 1090 | 1377 | 1326 | 903 | 1610 | 1044 | 100 |
| Attack | 197 | 1067 | 1935 | 2059 | 2164 | 2476 | 2353 | 2390 | 2980 | 458 |
| Arrests | 11 | 185 | 128 | 271 | 514 | 483 | 539 | 756 | 1182 | 233 |
| Mob violence | 6 | 464 | 659 | 2323 | 1927 | 1810 | 2453 | 3469 | 4159 | 598 |
| Looting/property destruction | 30 | 300 | 135 | 553 | 943 | 1886 | 1800 | 1383 | 1350 | 334 |
| Excessive force against protesters | 18 | 41 | 61 | 497 | 173 | 88 | 179 | 99 | 47 | 4 |
| Change to group/activity | 56 | 246 | 367 | 992 | 1425 | 2144 | 1327 | 1542 | 1560 | 230 |
| Abduction/forced disappearance | 45 | 133 | 152 | 257 | 499 | 723 | 1009 | 1050 | 1165 | 150 |
| Agreement | 11 | 25 | 72 | 180 | 67 | 66 | 34 | 25 | 18 | 2 |
| Sexual violence | 0 | 1 | 5 | 18 | 4 | 10 | 4 | 10 | 8 | 0 |
| Disrupted weapons use | 57 | 428 | 415 | 473 | 545 | 590 | 912 | 523 | 1192 | 320 |
| Remote explosive/landmine/IED | 315 | 1950 | 2863 | 3186 | 2327 | 2055 | 2023 | 1627 | 1224 | 223 |
| Armed clash | 1795 | 4976 | 11055 | 8011 | 7165 | 7077 | 5999 | 5880 | 7007 | 1417 |
| Shelling/artillery/missile attack | 855 | 2610 | 11623 | 10989 | 12653 | 7177 | 5780 | 9211 | 8945 | 3158 |
| Grenade | 46 | 73 | 68 | 93 | 142 | 263 | 170 | 211 | 313 | 60 |
| Air/drone strike | 4390 | 9394 | 15612 | 8473 | 7525 | 4637 | 4914 | 4135 | 5664 | 2621 |
| Headquarters or base established | 7 | 1 | 36 | 120 | 19 | 97 | 37 | 28 | 22 | 5 |
| Suicide bomb | 30 | 253 | 243 | 42 | 37 | 10 | 8 | 6 | 2 | 1 |
| Non-violent transfer of territory | 54 | 42 | 208 | 244 | 125 | 46 | 29 | 38 | 17 | 0 |
| Non-state actor overtakes territory | 150 | 58 | 912 | 719 | 372 | 92 | 67 | 107 | 47 | 0 |
| Government regains territory | 151 | 1154 | 1562 | 1166 | 478 | 766 | 437 | 86 | 17 | 0 |
| Chemical weapon | | | | | | | | | | |

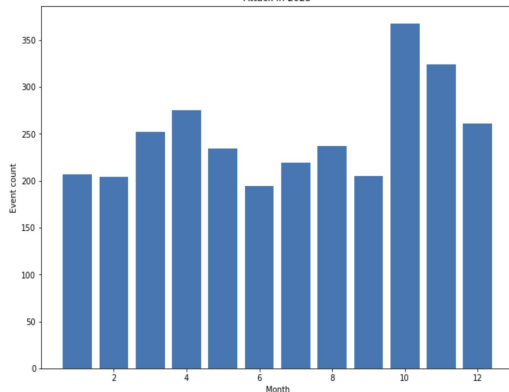# Influence of Attack on the stock price


Attack count by years


Attack in 2022


Attack in 2023





According to the plot, we plot the count of the Attack of event from 2015-2024 and we randomly pick years that have count over 2000 and find the most count months and we can see that the stock price also increase a lot.

# Influence of Missile Attack on the stock price


Shelling/artillery/missile attack by year


Shelling/artillery/missile attack by year in 2017
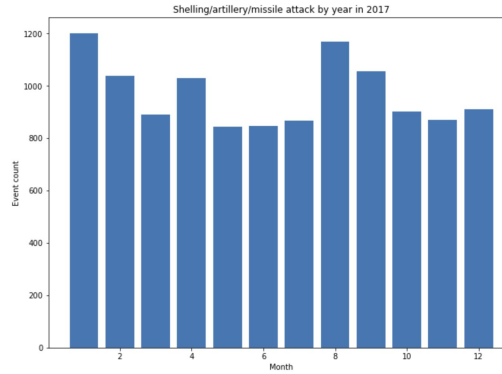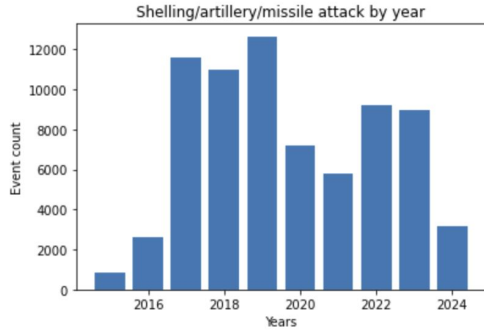


According to the plot, we plot the count of the Air drone strike of event from 2015-2024 and we pick the year that most count and second most count and find the mount that has the most count in this year and the stock of LMT is slightly increase by the end of the month


Shelling/artillery/missile attack by year in 2019
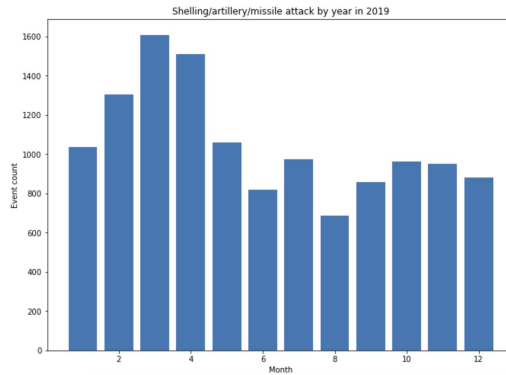
# Correlation Between Different Stocks



Stock Correlation Heatmap
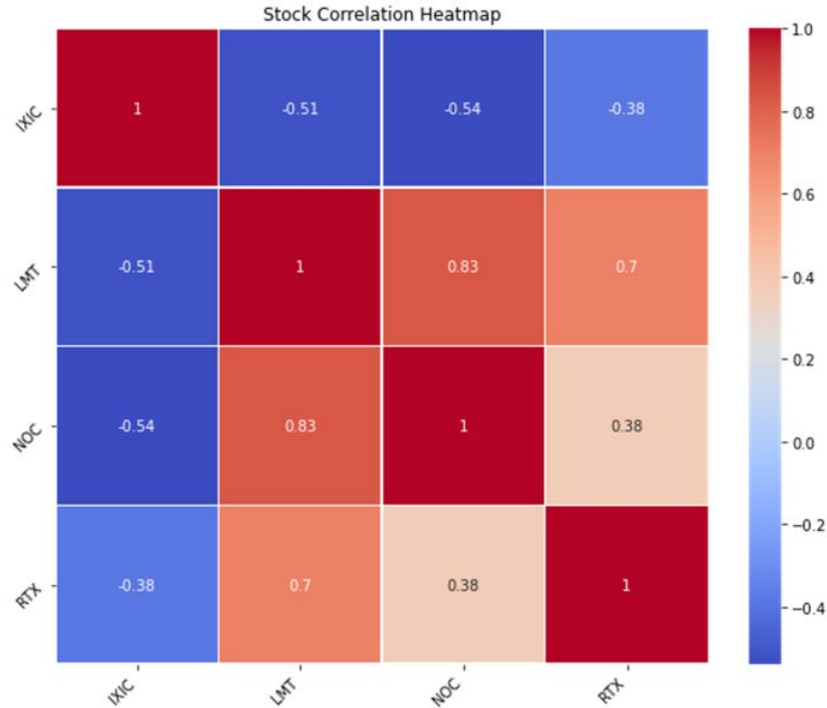
**Stocks** - IXIC, LMT, NOC, RTX

LMT and NOC exhibit a strong positive correlation (0.83), suggesting that when the price of the second stock rises, the price of the third stock is also likely to increase, and vice versa.

IXIC and NOC show a moderate negative correlation (-0.54), indicating that an increase in the price of the first stock may be accompanied by a decrease in the price of the third stock, and vice versa.

Stocks with negative correlation can be invested in together to reduce the overall risk of an investment portfolio.

# Apply LSTM to Predict the Price of RTX Stock

Dataset: RTX stock data (253*7), with 80% as the training set and 20% as the test set.
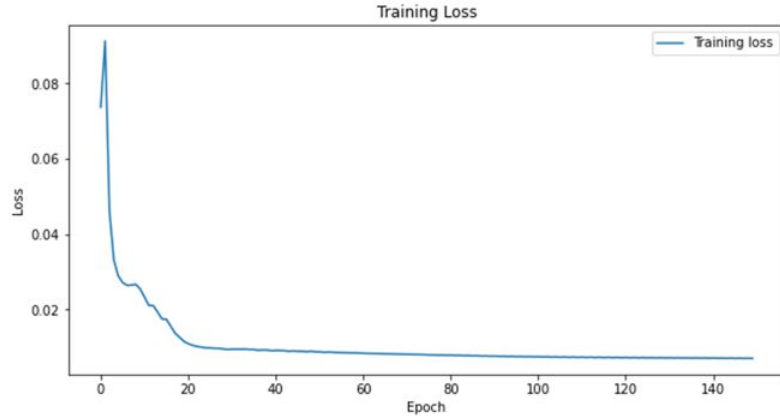
Input: Sequences of length 5 were chosen to construct input vectors for training the model.

**Shape of the input feature matrix**



**Time Line**
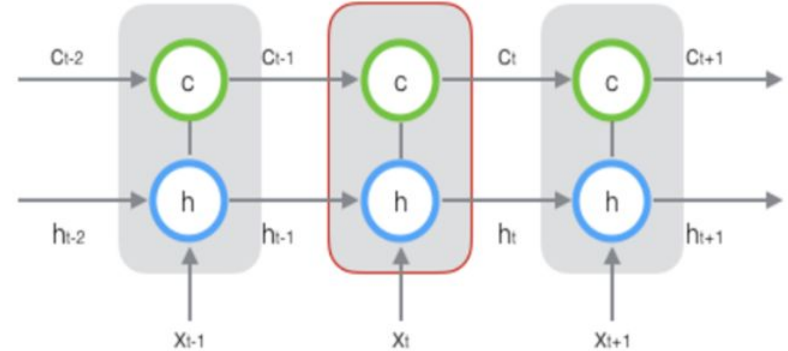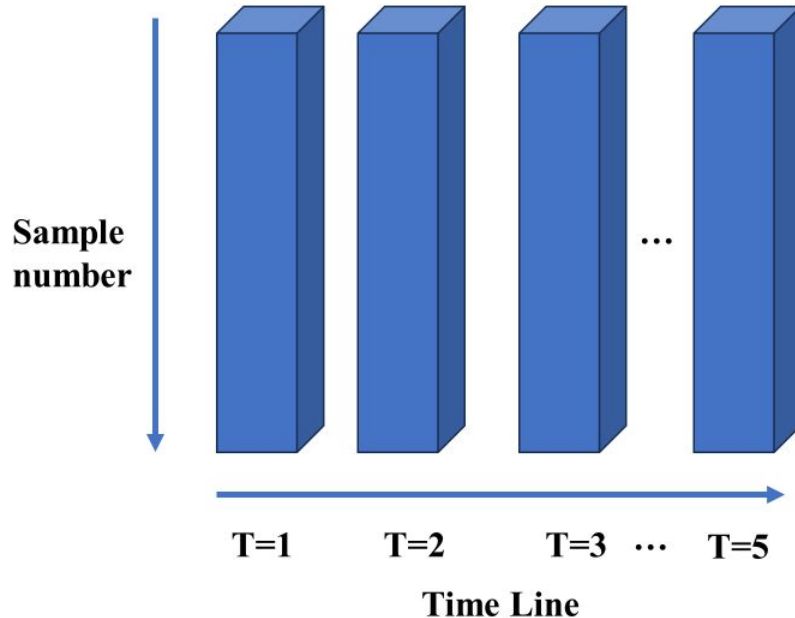


**Model Structure of LSTM**

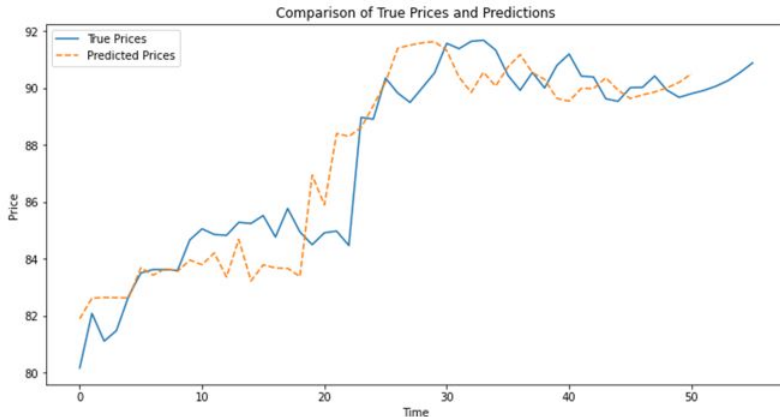# Apply LSTM to Predict the Price of RTX Stock



**Setting**

Epoch – 150

Loss Function – MSE

Optimizer – Adam



**Result**

The training loss effectively decreases and stabilizes to a convergent value.

Predictions on the test set and comparing with the true values, both the trend and the results are relatively close.

# Conclusion

1. Yes, escalating global tensions can predict stock prices of defensive companies.

2. This correlation provides strategic insights for investors.

3. Understanding this relationship leads to more informed investment decisions.

While our research successfully predicts stock prices of defense companies based on conflict index, it also raises ethical concerns about profiting from other countries conflicts

# Questions?

# Sources:

https://acleddata.com/ –Conflict event Data

https://finance.yahoo.com/ –Historical Stock Price Data

http://ourworldindata.org/ - war and peace data explores