

The Golden Ratio in Narrative Structure: Visualizing the Rising-Climax in Data Videos



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ABSTRACT AND INTRODUCTION

Data Videos have emerged as a popular narrative visualization storytelling form for public data communication. The climax of a data video critically presents the most crucial information to the audience. Nonetheless, building an impactful climax requires lots of guidance. The first step is understanding and visualizing the climax as a narrative stage. We draw inspiration from the mathematical theory of the Golden Ratio. Through an iterative coding process, we first analyzed the *Rising-Climax* of 63 data videos based on the Freytag pyramid structure. Then, we observed the statistics result between the *Rising-Climax* and the *Golden Ratio*. The result showed the potential coherence between the Golden Ratio point for data videos and the *Rising-Climax* point of data videos. We further conducted a case analysis to demonstrate how applying the *Golden Ratio* to the *Rising-Climax* sequence in data videos can enhance its construction.

METHOD AND RESULT

The main objective of this research is to observe the coherence between the *Golden Ratio* and the *Rising-Climax* of data videos. In our method, a study is conducted to investigate if this universal property is also embedded in the structure of data videos. The statistics are displayed in table 1.

Statistic	Value
Sample Mean	0.624
Golden Ratio	0.618
t-statistics	0.318
p-value	0.751
Confidence Interval	(0.59, 0.66)

Table 1: Statistics of Video Data

Therefore, based on the high p-value, we would fail to reject the null hypothesis and conclude that there is not enough evidence to suggest that the sample mean is significantly different from the hypothesized population mean, which is the *Golden Ratio*. The calculated p-value also suggests that if the hypothesis (no significant difference between the sample mean and the golden ratio) is true, we would expect to see a result as extreme as the one we observed in the high probability around 75% of the cases.

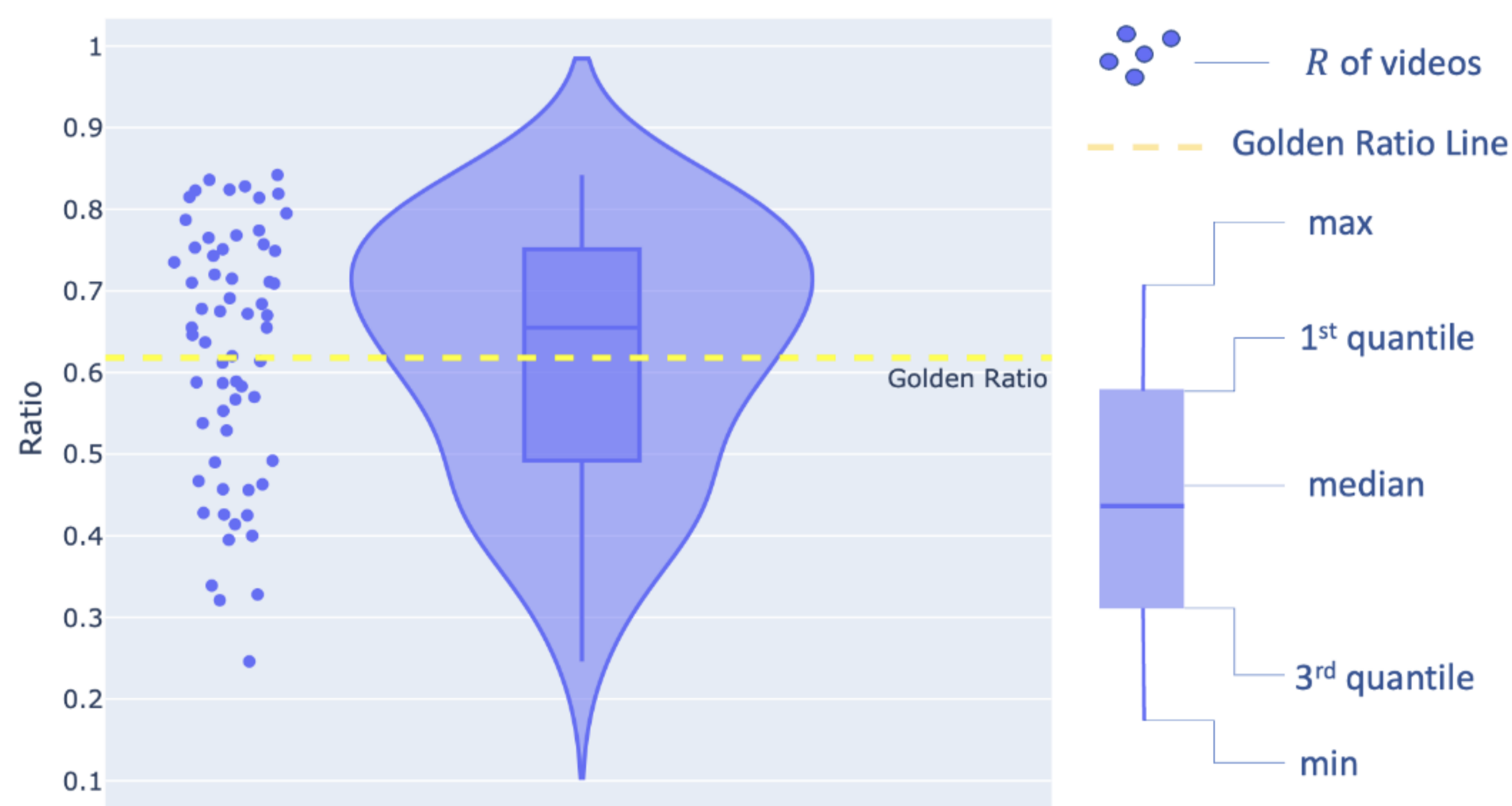


Figure 1: Ratio Data, Violin and Box-plot of 63 Data Videos

In Figure 1, the left scatter points represent the quantities R defined for 63 data videos. On the right, the violin and box plots of these quantities are shown. From the box plot, the median for the ratio quantities is close to the *Golden Ratio* (yellow dashed line). The violin plot illustrates the probability density of the quantities.

CASE ANALYSIS

To give a preview of how the *Rising-Climax* is present in a data video, this section presents one case from our corpus, which meets the occurrence of the *Rising-Climax* is at the *Golden Ratio* point.

The data video, *Did the US reopen faster than other countries?* produced by BBC News. This video explores the contrasting management of COVID-19 between Europe and the US, investigating safety measures and testing during the post-lockdown period in America.

As shown in Figure 2, the critical juncture of the *Rising-Climax* occurring at 2:57 happens to fall precisely at the *Golden Ratio* point of this data video. From this time, the video employs a progressive release of information, presenting diverse layers of escalating significance in a sequential fashion. These layers encompass comparative assessments between different states, various benchmarking indices, and international comparisons, ultimately leading to a final, thought-provoking question.

The sequencing of this information release aligns with the notion of the *Golden Ratio*, where each segment contributes to building the narrative tension, akin to the rising action in traditional storytelling structures. The escalation in the gravity of the information, culminating in a central query, embodies the *Rising-Climax*, thus demonstrating how the *Golden Ratio* can be harnessed to shape and control narrative tension in data videos.

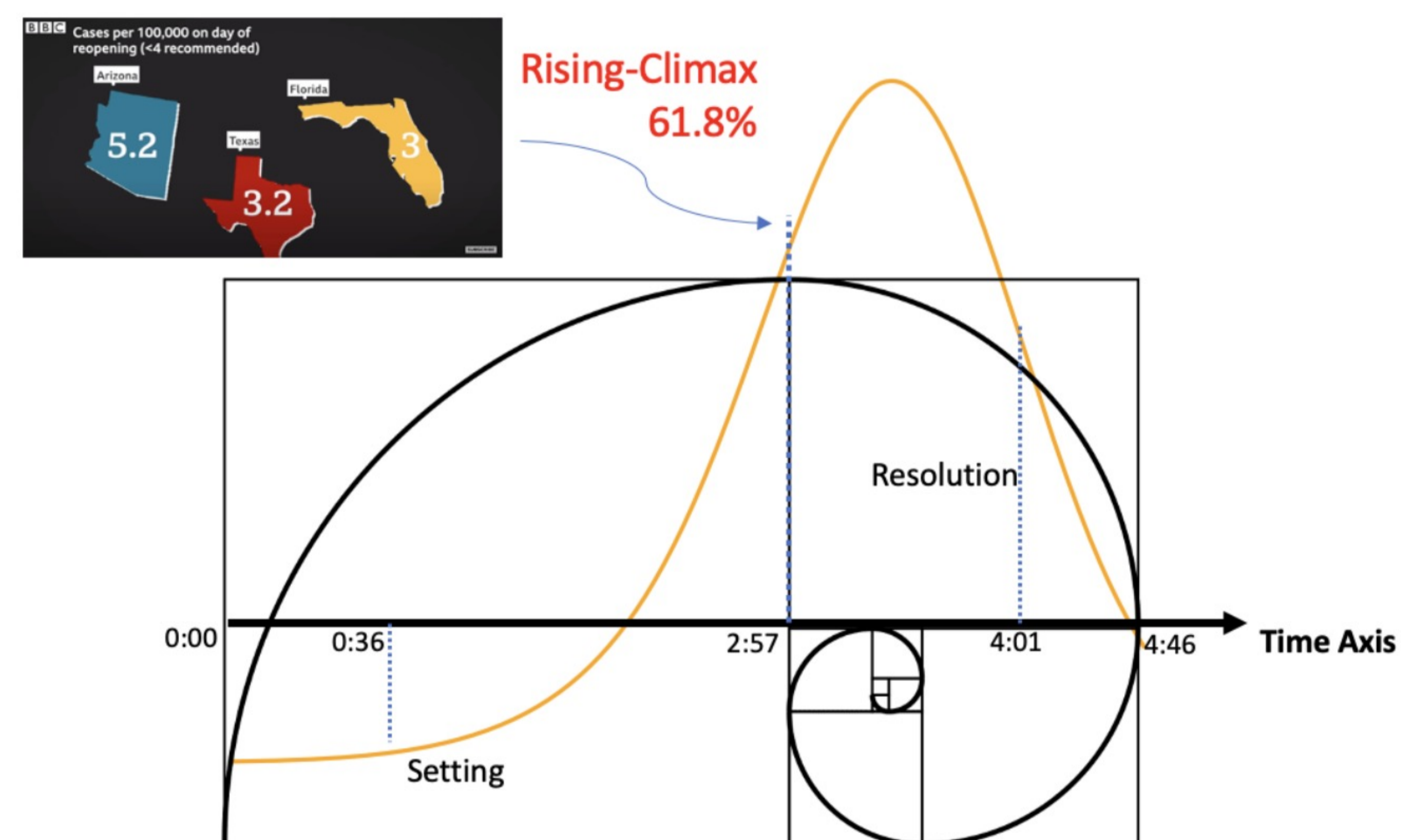


Figure 2: The coincidence between golden ratio point with respect to data videos and *Rising-Climax* time point of the data video.

CONCLUSION AND FUTURE WORK

In this work, we visualize the *Rising-Climax* in data videos from the perspective of the *Golden Ratio*. We found the time point of *Rising-Climax* has the potential coherence with the *Golden Ratio* point in high-quality data videos. We hope this finding can advance the body of knowledge on how to build an impactful climax and help data video designers convey their essential data insights effectively.

Future work should broaden the investigation of more features of climaxes in data videos through an interdisciplinary lens. This should encompass not only the critical quantitative analysis using mathematical tools but also the integration of advanced audio-visual media arts to enhance climax impact. Merging quantitative observation with cinematic arts could lead to innovative design approaches for compelling and impactful data video climaxes.