

Case ref. Number: 0196-12/2022
Case assigned by: Roi S.
Mode of receipt: Online request / website form
To, Mr. [HIDDEN]
Address: Not-disclosed

1 Description of the Documents:

The content of this report is made by **Aithenticate.art** based on the documents described below.

1. RGB Photo *stanlee.jpg* of resolution 960×720 , provided by the customer and showing an autograph on a comic book. The signature is handwritten using a marker pen. Refer to Figure 1 for the reproduction and Section 3 for a description.
2. RGB png scans of comics, books and other items with verified authentic autographs from Stan Lee, labeled “*Admitted Signatures*”. These include 15 verified authentic signatures from Stan Lee, extracted from autographed photos and documents he signed during his life. The selected 15 signatures are made with similar pen and extracted from the documents and items using the same technique as with **Q1**. The *skilled forgeries* are also made with the same requirements as the *Admitted Signatures*.



(a) Autograph on a comic book.



(b) Extracted signature.

Figure 1: Images of the autograph and area of inscription, used for the authentication.

1.1 Assignment

1. To prove that the area of inscription of the signature **Q1** is **free of alterations**, by using digital inspection techniques.
2. To validate the resolution and pixel ranges on the **areas of inscription** of the signature **Q1**, *Admitted Signatures* and *Skilled Forgeries* as **identical** by our Artificial Intelligence (AI) and other digital comparison techniques.
3. To find out whether the AI model determine that the Questioned Signature **Q1** and the *Admitted Signatures* have been handwritten by the same person.
4. To perform a **graphological description** of the signatures, and verify the consistency of their authentication cues in form and size.



The images we used in our AI authentication include the **whole autographed item or scanned standard specification documents**, in order to make the comparative up to scale. The size of the signature itself is an authentication cue, and our AI model recognizes the size relative to the document. Additionally, we compare the signature dimensions as an individual graphological cue.

1.2 Declaration of Standards

For this work, we are working subject of two international standards:

1. Scientific Working Group for Forensic Document Examination (SWGDOC)'s **Standard for Examination of Handwritten Items** for examinations and comparisons involving handwritten items and related procedures using side by side comparison methods.
2. **ANSI/ASB Standard 35: Standard for the Examination of Documents for Alterations** to ensure that there is no alteration of the document by physical, chemical, electronic, or mechanical means, or a combination thereof.

2 A.I. Authentication results

We run our AI based mathematical model trained on digitized images of the verified authentic *Admitted Signatures* and *Skilled Forgeries*. The diagram of the neural networks are shown on Figure 3.



Our AI model correctly classified 95% of the signatures in the experiment run, and classified as authentic the present autograph on the comic book. The verdict of the Artificial Intelligence model:

The AI classifies Q1 as AUTHENTIC with a probability of 95%.

The heatmap is shown in Figure 2:



Figure 2: On the left, the heatmap for **Q1**, showing in green the regions used by the AI classify it as **authentic**.



Heatmap on the signature: According to the AI model, the strokes in **Q1** that the AI used to prove the authenticity are located on the cursive S and t, with their connections, and also the ending e with the root of the underline. We observed that these regions are well preserved across other authentic signatures of Stan Lee, which we describe in detail in Section 3.

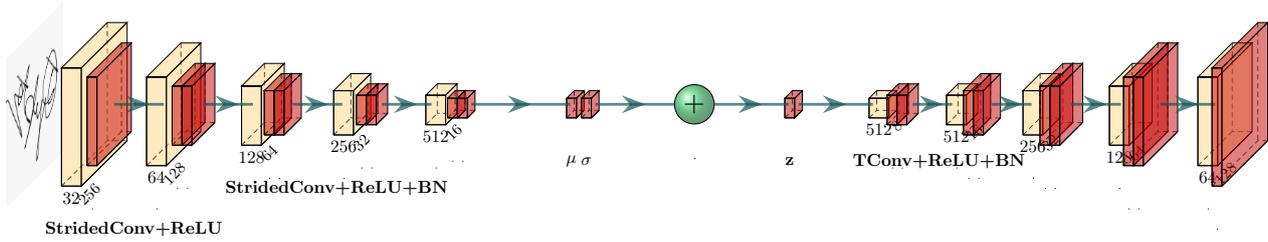


Figure 3: A diagram of the architecture for our AI model for Signature Authentication.

3 Signature description

In this section we describe **Q1** and a subsample of the *Admitted Signatures*, labeled as S1-S8, which we selected for including all the variations we observed in our research on the authentic signatures from Stan Lee:

Q1	S1	S2	S3	S4
S5	S6	S7	S8	S9

1. An inter-se comparison of the Admitted Signatures S1-S8 shows a varying general writing pose, with natural variations and a consistent rhythm.
2. The basic handwriting description must mention a consistent graceful fast penmanship. It is both fluid and legible, allowing the writer to write quickly without sacrificing the quality of the handwriting. It is evident that the author is used to sign often, and many key features are repeated across samples.
3. Fluid arcade and garland connections, with no general preference of one over the other, is observed on **Q1** and *Admitted Signatures*.
4. Cursive handwriting for both uppercase and lowercase, which enables different right slants across samples.
5. Tendency to keep the angularity and waviness along the signature. This is coupled with smooth and rather fast writing pace.

6. Identical bonafide format of **Q1** and *Admitted Signatures* S1-S8.
7. The presented autographs are made at noticeably different speeds. Though, **Q1** shows identical line qualities, letter designs, poses and relative sizes, compared to S1-S8. These four cues are usually preserved when all the signatures are made by the same person.
8. Relatively identical spacing for the all the characters for the **Q1** and *Admitted Signatures*.

3.1 Individual/personal graphological cues

Here, our graphologist analyzes personal cues of the signatures, their location and how they propagate across different samples:

Q1	S1	S2	S3	S4
S5	S6	S7	S8	S9

- (a) Usage of an underline starting at the end of the signature and going down backwards, parallel to the baseline.
- (b) Usage of the opening capital S to make the tittle of the letter t.
- (c) A fluid thread connection after the initial of the name.
- (d) Steep ascending baseline on most of the signatures. Also, the right slant tends to keep well maintained across signatures. Variations in baseline across samples, unrelated to another graphology cue, is not a feasible authentication cue.
- (e) In **Q1** we observe the following characteristics traits of a rather **fast writer**: Ascending baseline. Right slant. Usage of both **arcade**, **garland** and **thread** connective forms.



The writing **speed** is a remarkably characteristic trait, although difficult to assess accurately, and subject to change from one sample from another. However, the **variations in speed** are always observed around the same character in signatures made by the same person. Additionally, the locations of the **peaks of speed** of writing are kept constant across authentic signatures.

4 Conclusion

We firstly used our unique Artificial Intelligence based mathematical models applied to the digitized images of the autograph Q1 and the signatures we compiled. The verdict of the Artificial Intelligence model was that **the signature is an authentic autograph** from Stan Lee, with a high classification probability of 95%, which ties to the graphological description of the signature. Our characterization of the signature in Section 3 includes a thoughtful description. We have found a handful of traits which are in common with other verified signatures from Stan Lee.

5 Disclaimer / Legal note

The present report by Aithenticate.art is the result of the digital analysis and description of the images of the signatures submitted by the customer, using mathematical models. This analysis has been done with Diligence and Good Faith, but Aithenticate.art does not provide any warranty with the correctness of the sentences in this report with respect to the authenticity, or guarantees any error-free operation of Image Analysis Software, including the Artificial Intelligence (AI) model used. To the extent permitted by law, all warranty and liability of Aithenticate.art is hereby excluded, including, but not limited to, liability for financial damage in connection with the use of the present report document and the confidence in it, any decisions taken, purchases, sales, insurance, security, display or other dispositions relying upon the present report, damage or loss profits due to incorrect statements in the report. For further information, please refer to our [Terms and Conditions](#).