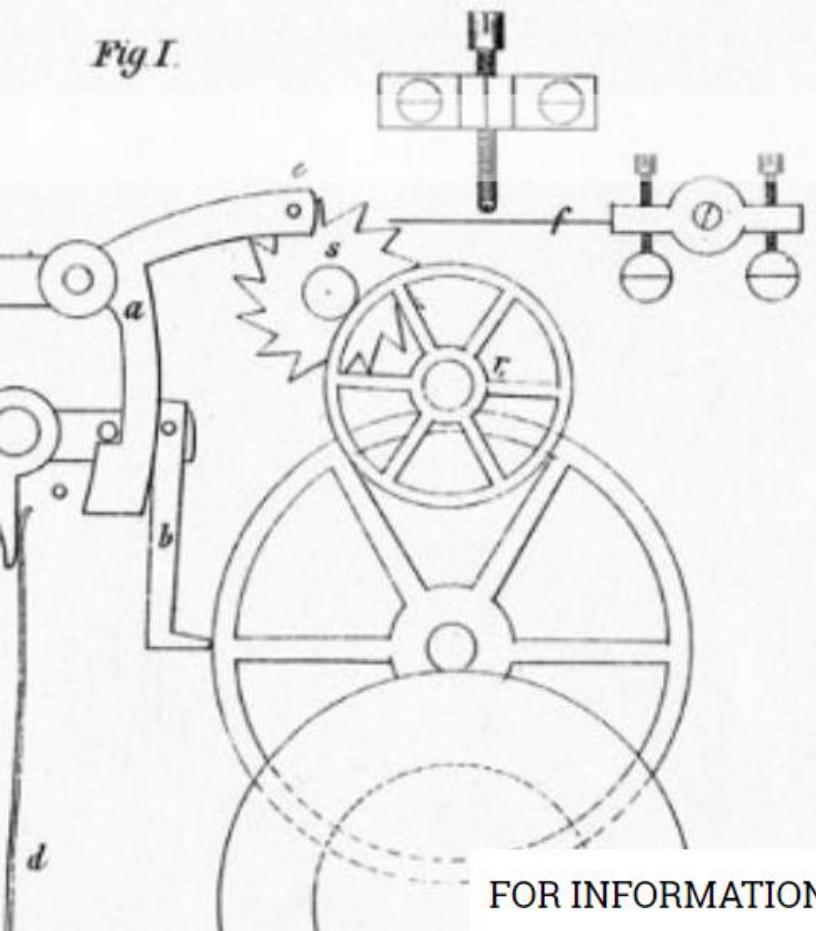
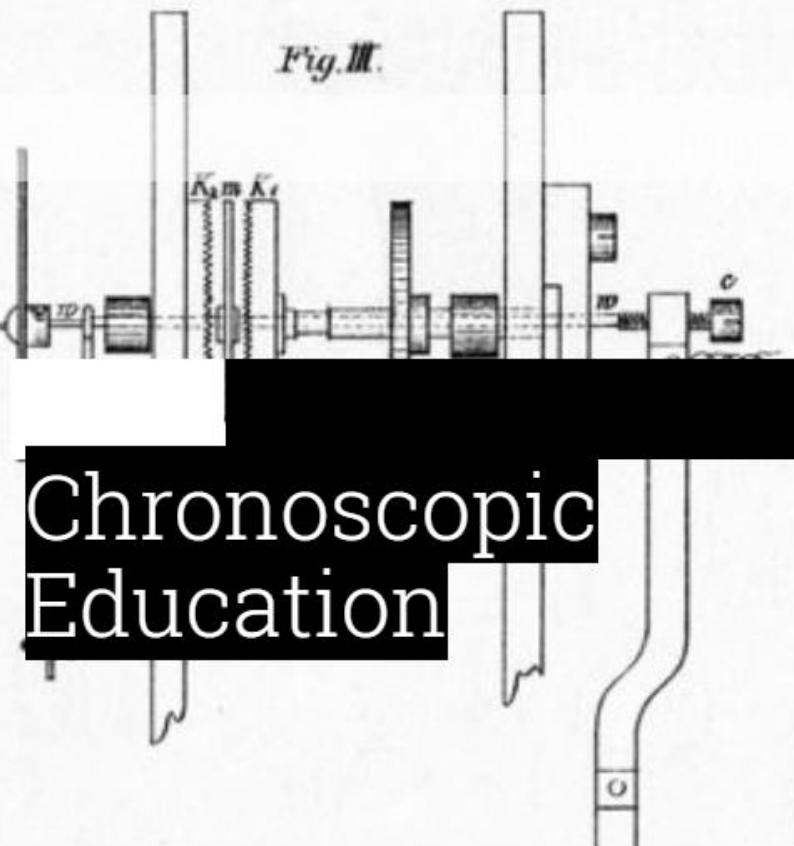


Fig.I.



FOR INFORMATION ABOUT OUR OUR AIMS AND OUR PROJECTS

Fig.III.



Chronoscopic
Education

Hirsch Chronoskopische Versuche.

Fig.V.

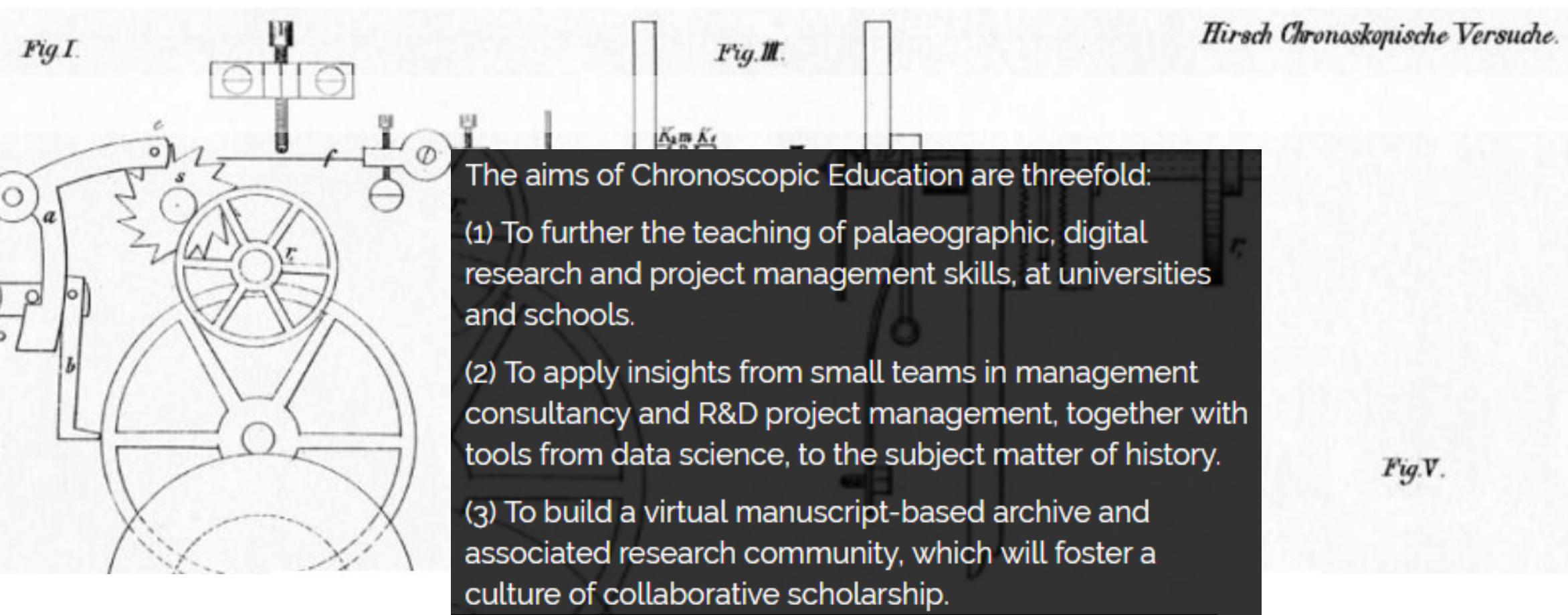


Signs of Literacy Kaggle Research Competition

Colin Greenstreet

Thursday, June 28th, 2018

Our social aims



Project portfolio

<http://www.chronoscopic.org>

MarineLives



Signs of Literacy



Maphackathon



EM Textiles, Garments & Dyestuffs Glossary



EM Maritime & Mercantile Gazetteer



Signs of Literacy Kaggle Research Competition, Nov 2018 – Jan 2019



Google owned Kaggle has selected us as one of a small number of pro bono competitions they support each year on the merits of our proposal, and the potential impact on the research field and community of the competition.

Kaggle will cover the running costs of the competition. We will provide the prize pool, and are now seeking to raise US \$30,000 from potential sponsors and partners.

The Proof of Concept will contain two parts:

- (1) Algorithmic identification of marks, initials and signatures.
- (2) Algorithmic discrimination between degrees of "sophistication" within the three categories of "mark"; "initial(s)", and "signature".

Having proven the concept, we will seek out an image or vision oriented computational laboratory with which to develop a grant funded collaboration to take the work further in 2019 and beyond.

Technical vision & role of the Kaggle competition

- Automatic identification of manuscript pages containing signoffs
- Markup of manuscript pages to isolate signoffs (markes, initials, signatures)
 - Hand markup of manuscript pages, but ideally automated markup
 - Signoffs can be single or multiple, for single or multiple depositions
 - Deponent signoffs; interpreter signoffs
- Automatic differentiation between classes of markes, initials and signatures
- Automatic differentiation within each class as to sophistication of execution & other parameters as a surrogate for literacy
- Automatic identification of manuscript pages containing deponent metadata (name; age; occupation; place of residence; date of deposition)
- Markup of manuscript pages to isolate deponent metadata
- Hand writing text recognition of deponent metadata and associate metadata with correct signoff

Legal deposition

Deposition of Mark Harrison; mariner and master; resident in Wapping, Middlesex; age 27;
Dated September 21st 1659 (TNA, HCA 13/68, ff. 1r-3r)



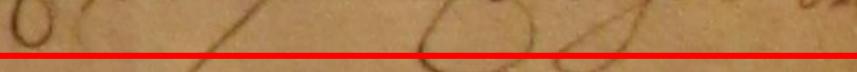
Metadata

The 21st Day of September 1689 1
Examined upon the affaile on the behalfs of
the sayd Negro of the Liberty of Enghland by
Mark T. Garrison of Newbury in
the County of Middlesex aged
seven and twenty years or there abouts
sworn frome and examined upon his affaile
in the following manner

Signoff

To the old he said he would not tolerate the institution of the Cotton Slave & it affected
him very much. His attachment for the Cotton affair gave you power over him
of the State, and by your means I got him the Vice-Admiral's Commission
but after his promotion when he advanced to from this in favor of the slave he would
not stand. General Lee was of the opinion that a day or two days of
five hundred yards of 3 & 4 gun the Captain of a Slave-boat G. W. Shultz
captain of the Cotton Slave a general of one rank in a Company but does much
more than a general of one rank in a Company. And so it is
that General Lee has a general of one rank in a Company
and the other day he wrote a letter to General Lee in which he said of
the day before that the cotton boat general of one rank in a Company
of the day before he would have been a general of one rank in a Company
of the Cotton Slave at the time of his promotion and afterwards he became
the same as the Leader of the Slave. And so it is with General Lee for all the benefit
of the day before, he called when he became a general. And if General Lee
knows of the Captain of the Cotton Slave and the Captain of the Cotton Slave
he cannot not take out of the Cotton Slave from small parts of his
and from other persons a certain land or another portion of his journal just
as General Lee did in his day.
To the old he said generally for my day it was
likely to be the first day he was not bound to an anchor
as the Cotton Slave, there being no any flags flying out on board the ship
General Lee for a year when he had the Cotton Slave, but the Cotton Slave
allowed by the State only.
To the old he said that in case the said day the morning after I should
die and you were to be the Captain you would do the same as according
to the officer he has in the Cotton Slave flag, and according to me I
or any man of your command under your flagship, and get away from them
in a boat.

On the fourth Sabbath in December and January of the year before this document was
made, one of the Deacons of the Church of the First Congregational Society of New Bedford,
and most around the said church at that time, of friends of the cause,
by some of the thoughts of old Commissaries, and such as the said Deacons
had sent away, hath given \$1000 for the same, and \$500 for advances to

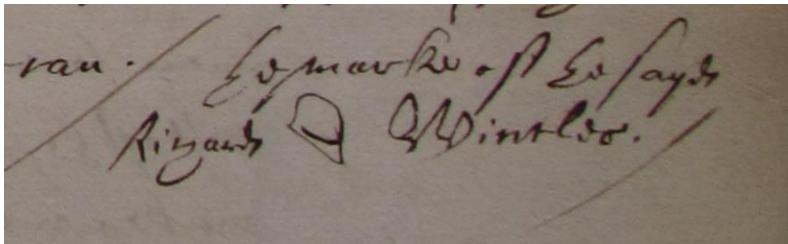
Wanting for gold, and according to an old
maxim of Boethius, and not otherwise. — ob-
liged.
+
Mark Harrison

Mark Harrison

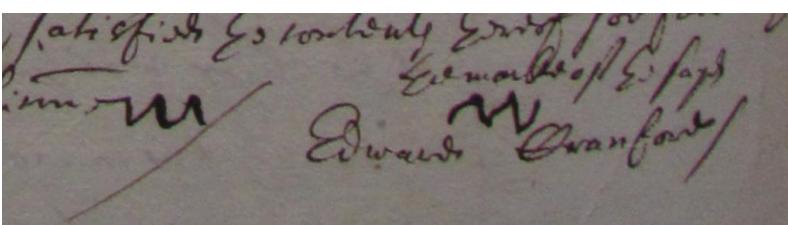
26th Day of September 1653

Porters handling coals, whale oil, ginger & corn

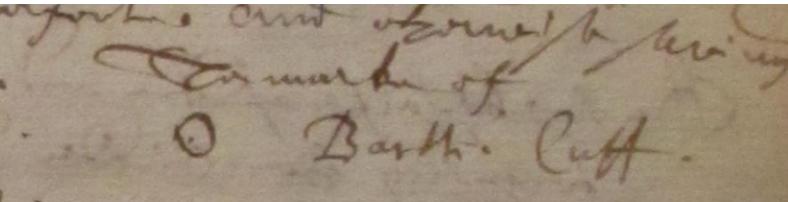
Richard Wincles, thirty-three year old porter, of the parish of Stepney, Middlesex, Dec. 15, 1656; employed as a labourer with fifteen other men to unload coals from the *Imployment* moored near Execution Dock, Wapping, into lighters for fixed rate of 12 s per man ([HCA 13/70 f.554r](#))



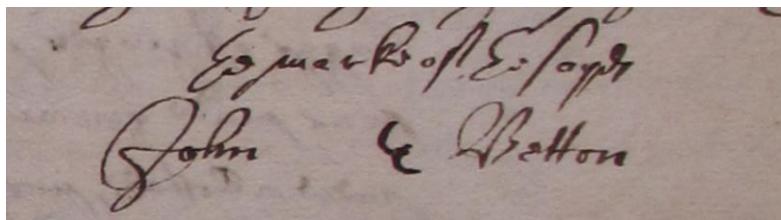
Edward Cranford, forty-four year old coale heaver or porter, of the parish of Stepney, Middlesex, Dec. 15, 1656; employed as a labourer with fifteen other men to unload coals from the *Imployment* moored near Execution Dock, Wapping, into lighters for fixed rate of 12 s per man ([HCA 13/70 f.555v](#))



Bartholomew Cuff, sixty year old porter of the Stillyard, of the parish of Allhallows the Greate, London, May 15, 1658; assisted in the landing of whale oil from lighters at the Stillyard Key and loading them away into a warehouse ([HCA 13/70 f.555v](#))



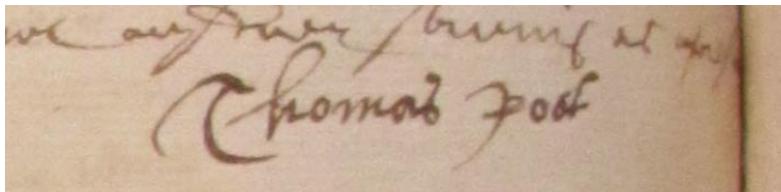
John Betton, fifty-four year old citizen and white baker of London, of the parish of Saint Buttolph Algate, London, Jul. 31, 1655; self-described as a porter employed by the Commissioners for Prize Goods to deliver ginger from a warehouse at Ralphes Key ([HCA 13/70 f.449r](#))



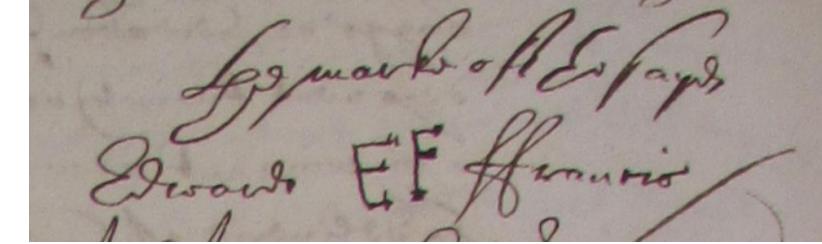
Edward Sherwin, fifty-six year old cittien and leatherseller, of the parish of Little Allhallowes, London, Jul. 31, 1655; self-described as a porter employed by the Commissioners for Prize Goods to deliver ginger from a warehouse at Ralphes Key ([HCA 13/70 f.449v](#))



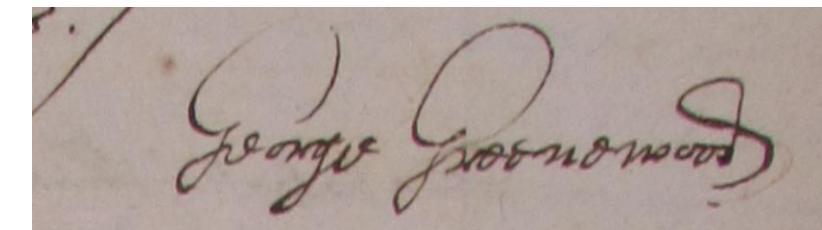
Thomas Roots, twenty-nine year old porter, of the parish of Greate Allhallowes, London, May 15, 1658; assisted in the landing of whale oil from lighters at the Stillyard Key, as one of the Stillyard porters, and loading them away into a warehouse ([HCA 13/72 f.330v](#))



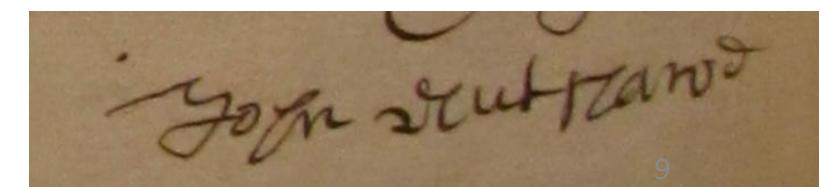
Edward ffrancis, citizen and merchant taylor of London, of the parish of Saint Olave in Southwarke, Jul. 31, 1655; self-described as a porter employed by the Commissioners for Prize Goods to deliver ginger from a warehouse at Ralphes Key ([HCA 13/70 f.450v](#))



George Greenwood, thirty year old citizen and vintner of London, of the parish of Saint Buttolph Bishopsgate, London, Jul. 31, 1655; self-described as a porter employed by the Commissioners for Prize Goods to deliver ginger from a warehouse at Ralphes Key ([HCA 13/70 f.454r](#))

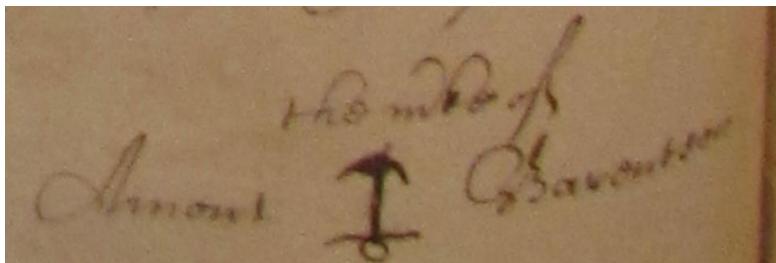


John Nutshall, fifty-five year old corne porter, of the parish of Saint Saviours Southwarke, Nov. 19, 1653; employed with a barber chyrurgeon/corne meter, an additional corne-meter, and other labourers to unlade a cargo of what in the *ffortune* of Stettin, moored against Limehouse; eight years of experience as a corne porter ([HCA 13/70 f.352v](#))

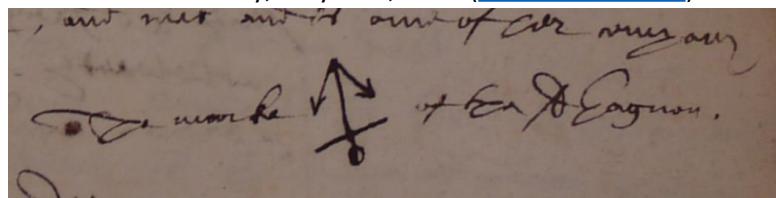


Anchors

Amons Barentsen, thirty-five year old mariner, of Copenhagen, Denmark, October 13th, 1653; self-described as an "ordinary mariner", hired to sail from the Sound to Hamburg on the *Golden Hawke* of Stockholm ([HCA 13/68 f.81v](#))



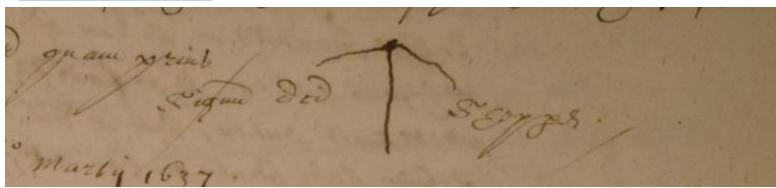
Claude de Gagnon, twenty-five year old mariner, of Melon, near Brest in Britanny, May 22nd, 1656 ([HCA 13/71 f.225r](#))



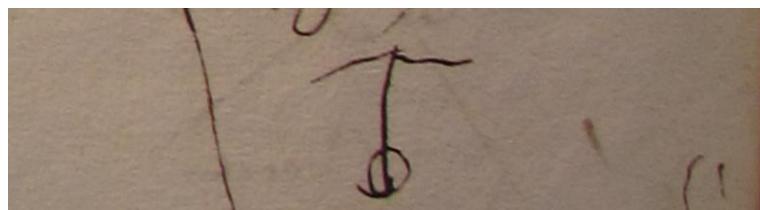
John Tylor, forty-two year old shipwright, of Lower Shadwell, in the parish of Stepney, Middlesex, February 14th, 1659 ([HCA 13/73 f.36r](#))



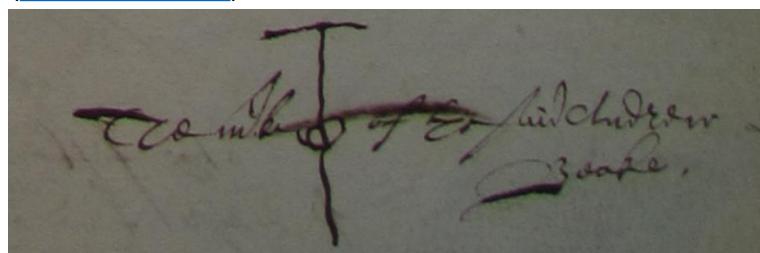
Richard Shepperd, fifty-eight year old cooke, of Brixton, Devon, March 29th, 1637; self-described cooke of the *Hope of Ipswich* ([HCA 13/53 f.87r](#))



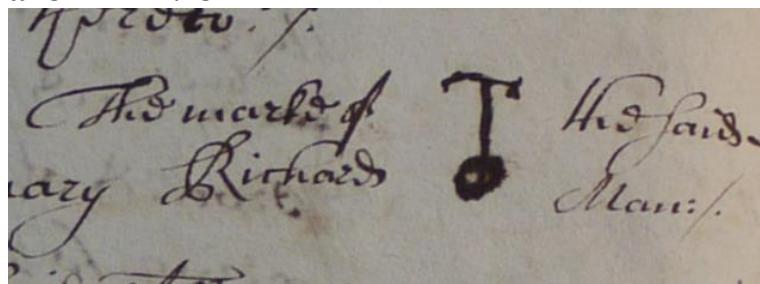
Andrew Beake, thirty-six year old lookeinglassemaker and formerly seaman, of Rose alley without Bishopsgate, London, January 21st, 1655 ([HCA 13/70 f.252v](#))



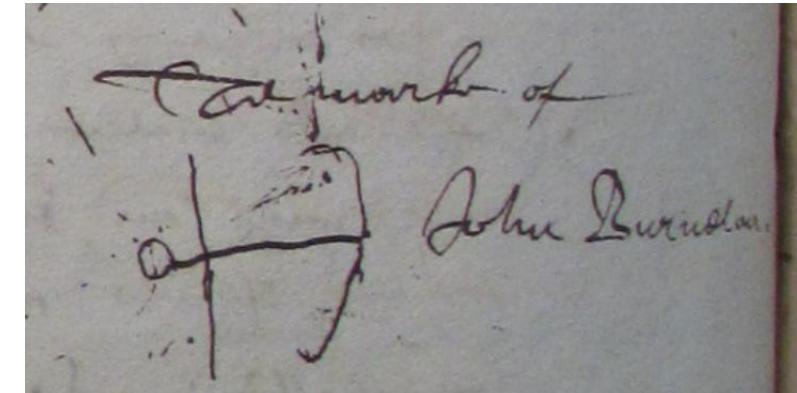
Andrew Beake, thirty-six year old looking-glasse maker, of Rose-Alley in Bishopsgate streete, London, February 13th, 1655 ([HCA 13/70 f.252v](#))



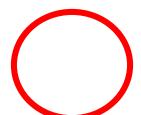
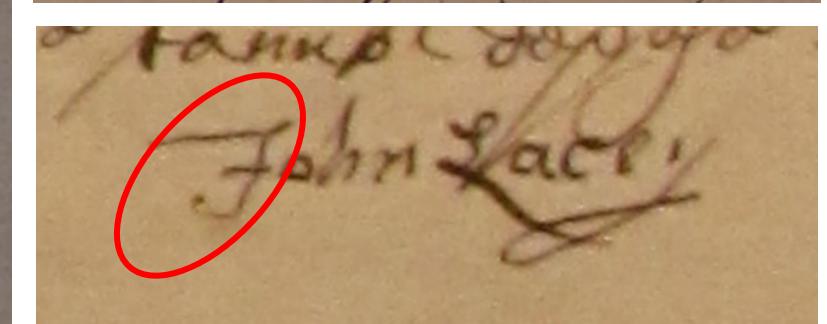
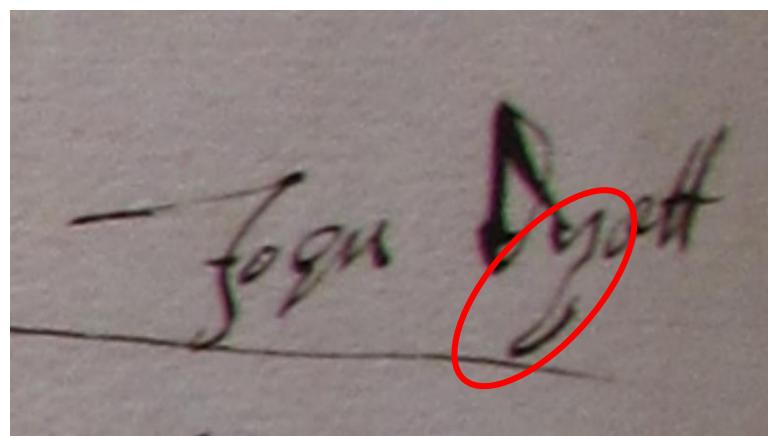
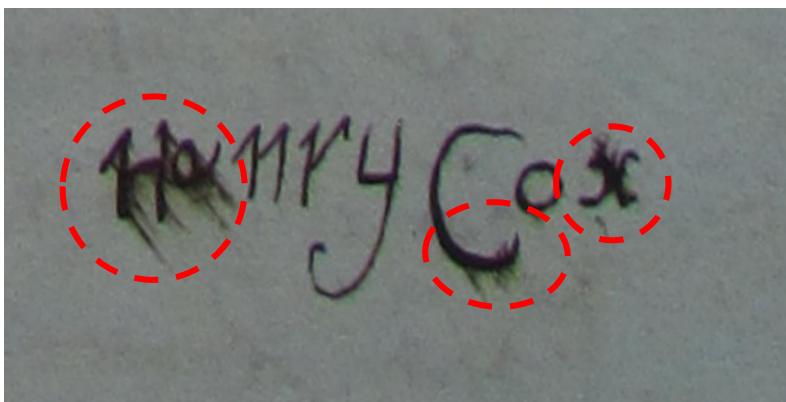
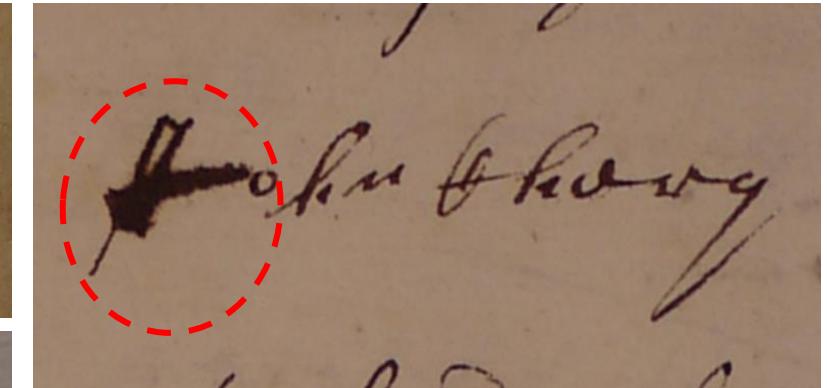
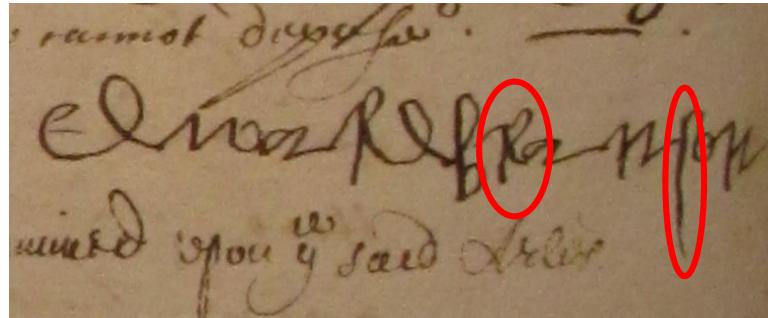
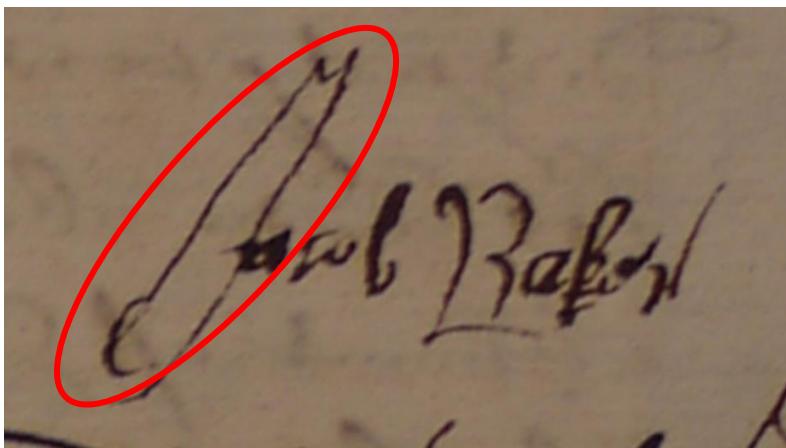
Richard Man, thirty-one year old mariner, of Southampton, January 8th, 1659; self-described common man of the *Lisbone ffrigott* on voyage to Oratava ([HCA 13/73 f.26v](#))



John Burnelau, twenty-eight year old sailor, of Mornar, France, March 30th, 1661 ([HCA 13/73 f.486v](#))



Physical characteristics of poorly executed signatures for machine detection – Part 1



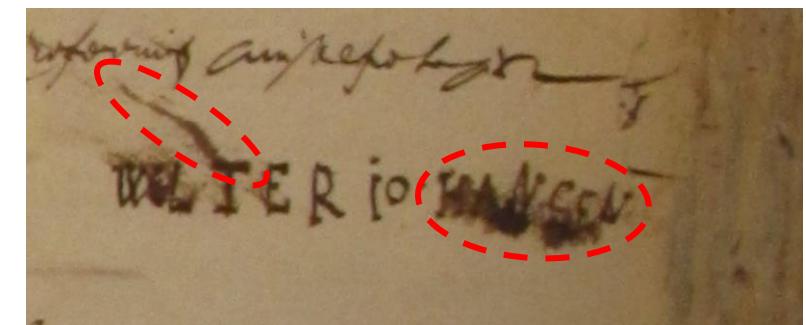
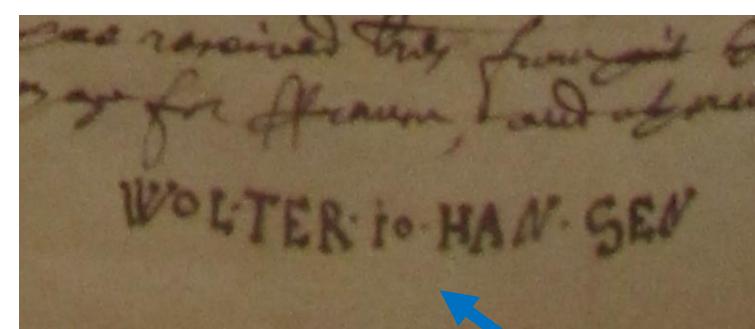
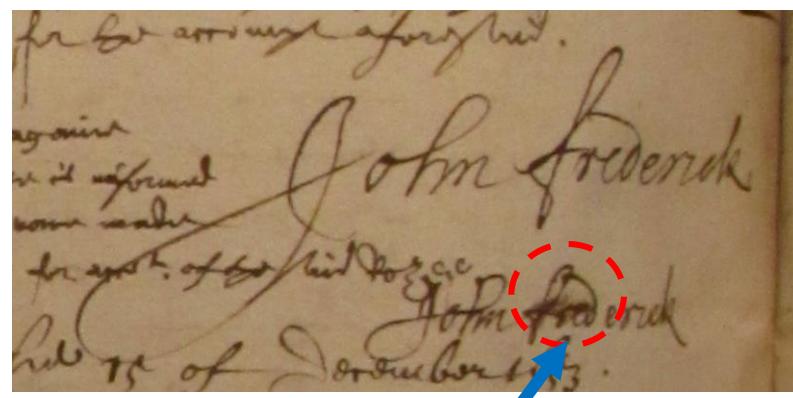
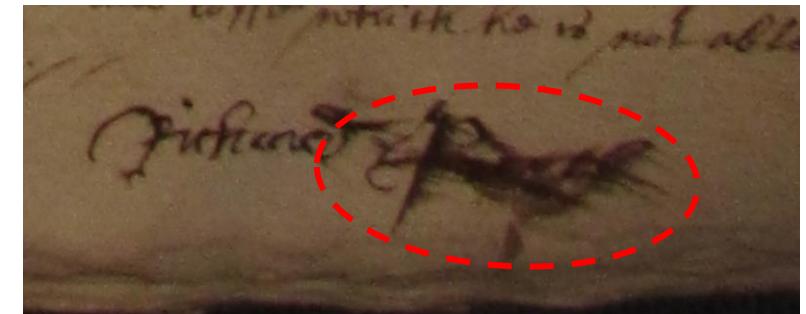
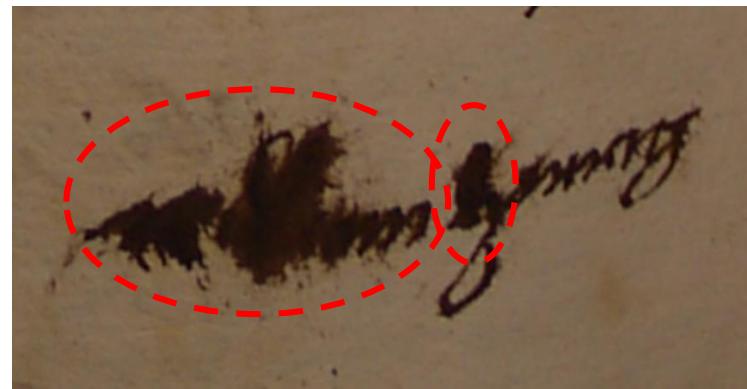
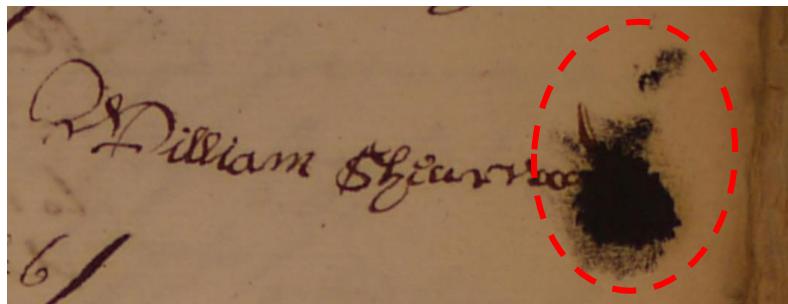
Shaky straight lines and/or loops



Ink blots or smudges

Source: Clockwise from top LH side: KaggleTestSnippet_HCA_1371_f.263v.PNG, KaggleTestSnippet_HCA_1368_f.483v.PNG, KaggleTestSnippet_HCA_1371_f.456r.PNG, KaggleTestSnippet_HCA_1368_f.51v.PNG, KaggleTestSnippet_HCA_1370_f.168v.PNG, KaggleTestSnippet_HCA_1370_f.167r.PNG

Physical characteristics of poorly executed signatures for machine detection – Part 2



Even London alderman & merchant, John Frederick, could smudge his signature, when signing an addendum to his deposition three weeks after the first deposition

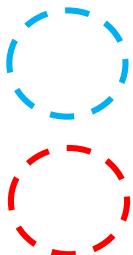
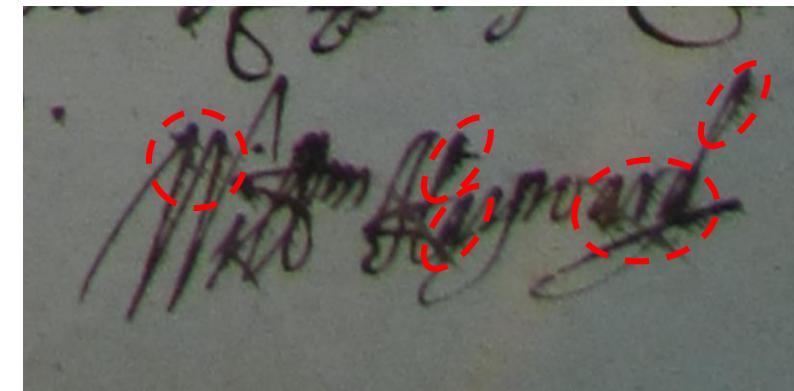
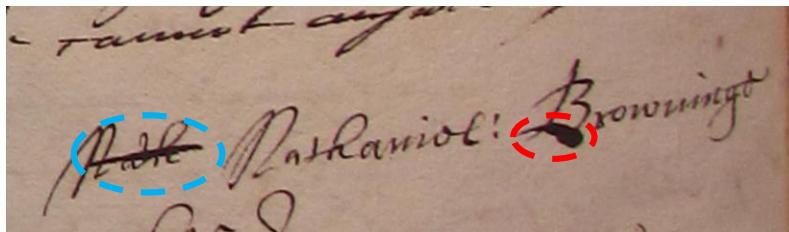
Wolter Johansen signed a second deposition smudge free, whilst signing both times with capitals



Ink blots or smudges

Source: Clockwise from top LH side: KaggleTestSnippet_HCA_1371_f.503r.PNG, KaggleTestSnippet_HCA_1373_f.498v.PNG, KaggleTestSnippet_HCA_1368_f.59r.PNG, KaggleTestSnippet_HCA_1368_f.231r.PNG, KaggleTestSnippet_HCA_1368_f.239v.PNG, KaggleTestSnippet_HCA_1368_f.241v.PNG

Physical characteristics of poorly executed signatures for machine detection – Part 3



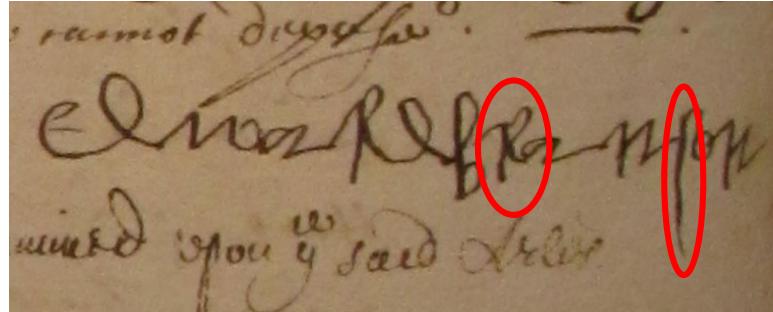
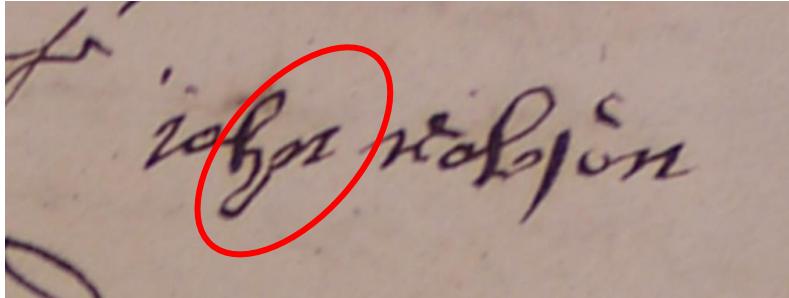
False start



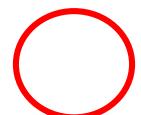
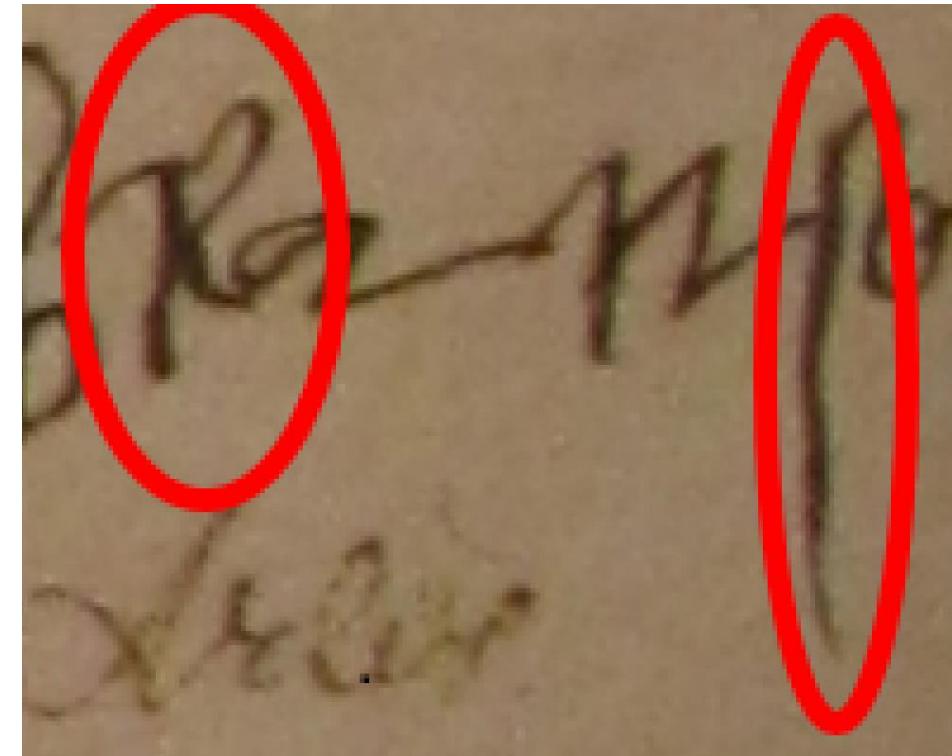
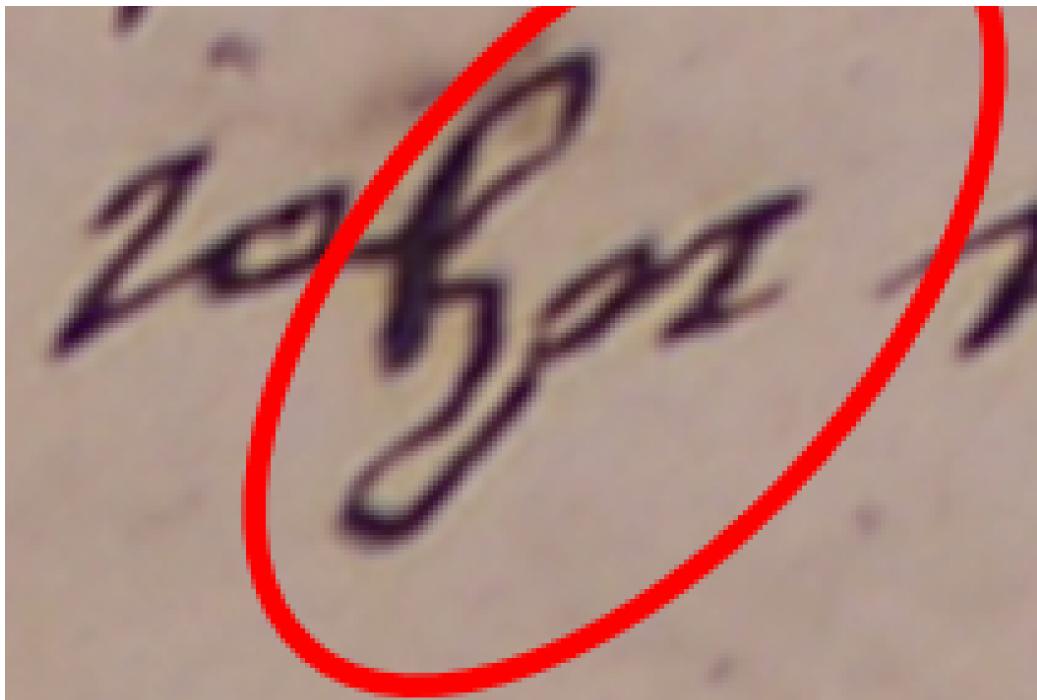
Ink blots or smudges

Source: Clockwise from top LH side: KaggleTestSnippet_HCA_1370_f.387v.PNG,
KaggleTestSnippet_HCA_1370_f.13r.PNG

We are looking for algorithms to detect “shake” in straight and curved lines



HYPOTHESIS: Shaky lines are a sign of poor signature execution (and by inference, poor handwriting execution) suggesting lower level of literacy than smooth executed lines



Shaky straight lines and/or loops

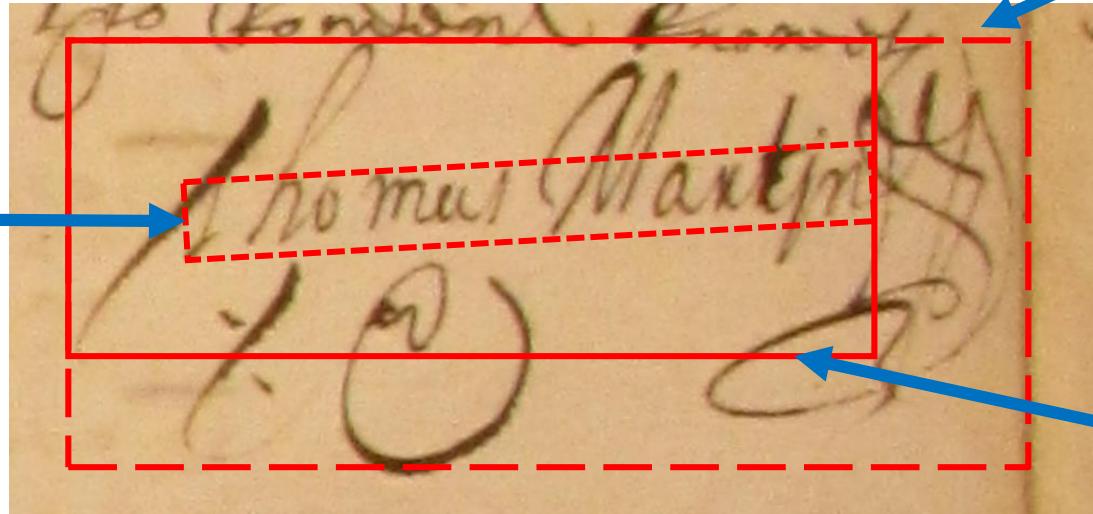
Clockwise, from top LH: KaggleTestSnippet_HCA_1371_f.435v.PNG,
KaggleTestSnippet_HCA_1368_f.483v.PNG, KaggleTestSnippet_HCA_1368_f.483v_PIXELS.PNG,
KaggleTestSnippet_HCA_1371_f.435v_PIXELS.PNG

Boundary boxes marking the visual geometry of a signature

Inside boundary box,
excluding uppers and
downers

Outside boundary
box, including
flourish

Middle boundary
box, including all
letters, but excluding
flourish



Statistics

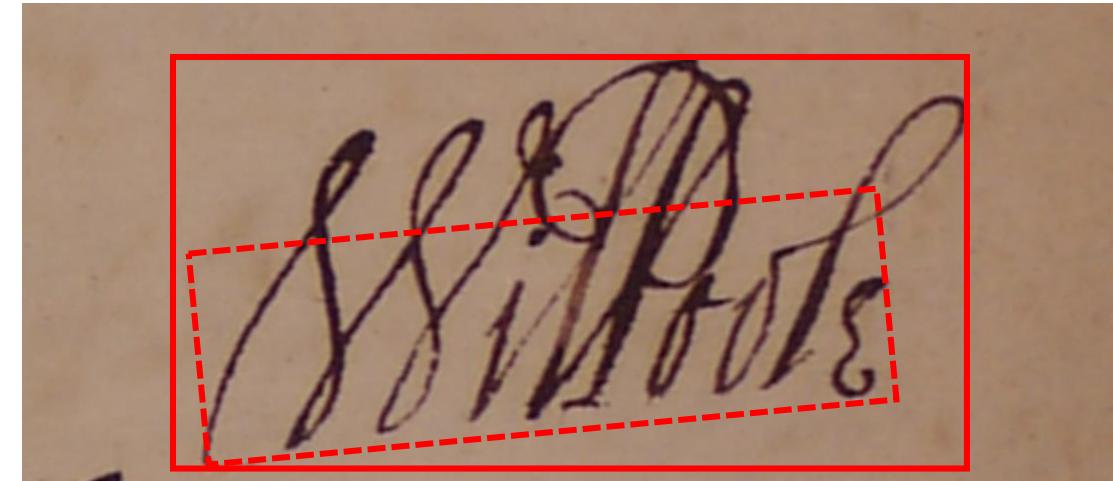
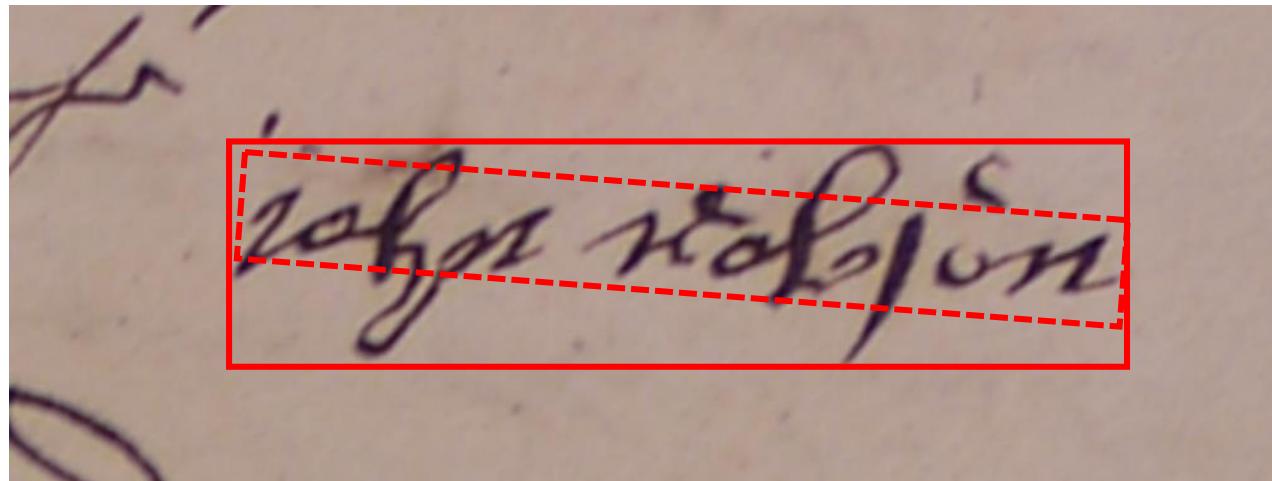
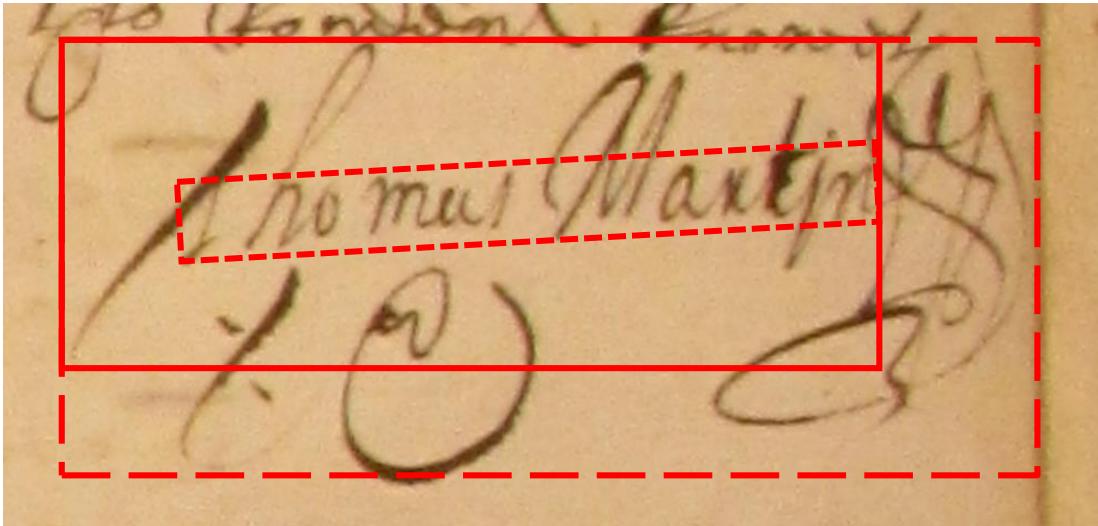
Inside boundary box: 9.0 x 1.1

Middle boundary box: 9.75 x 4.25

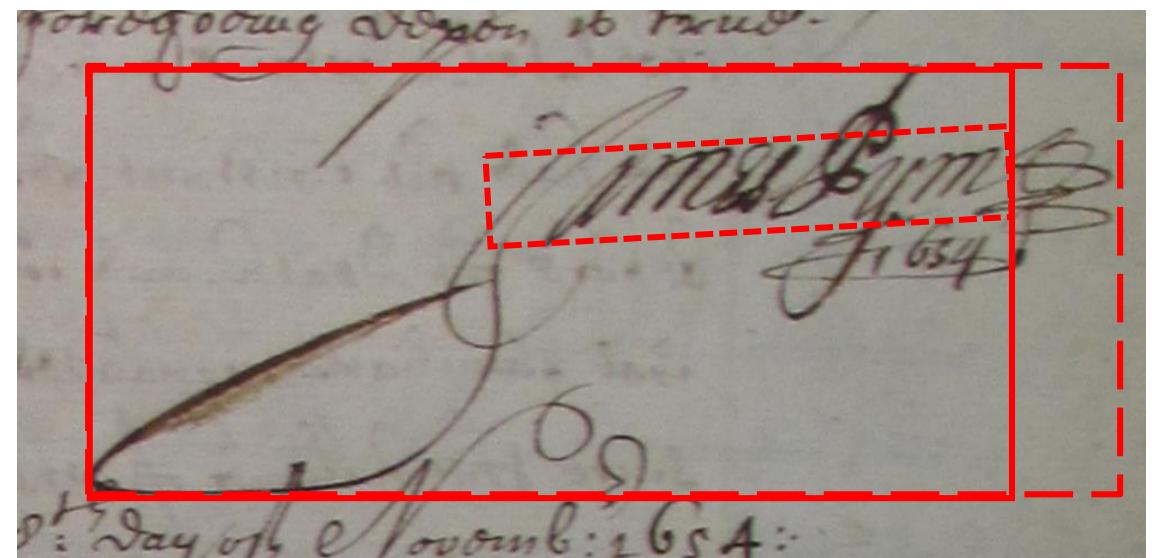
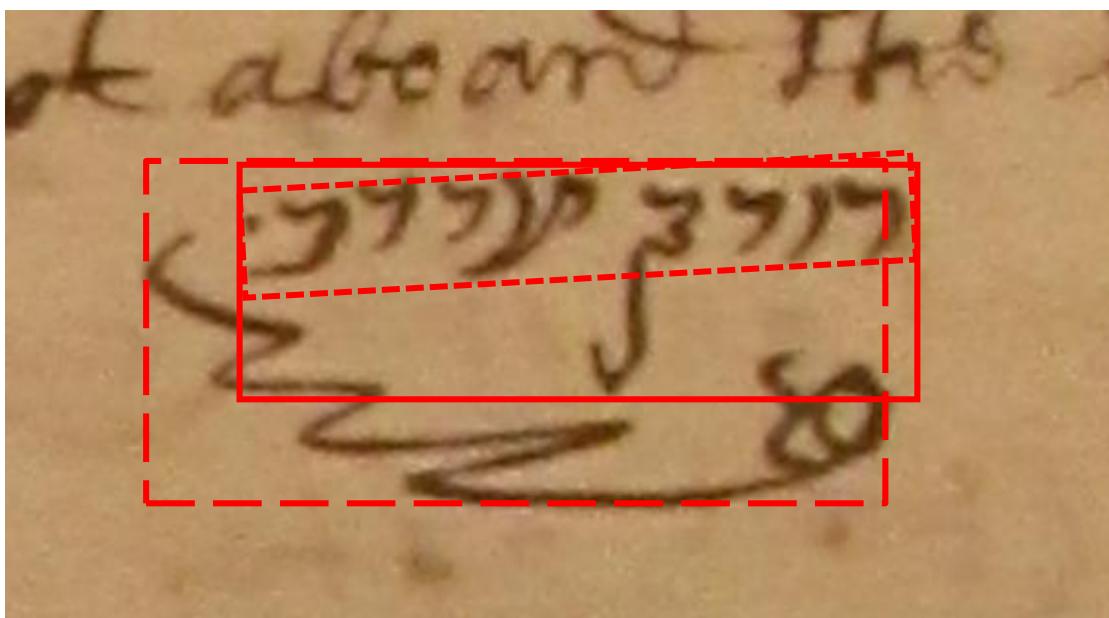
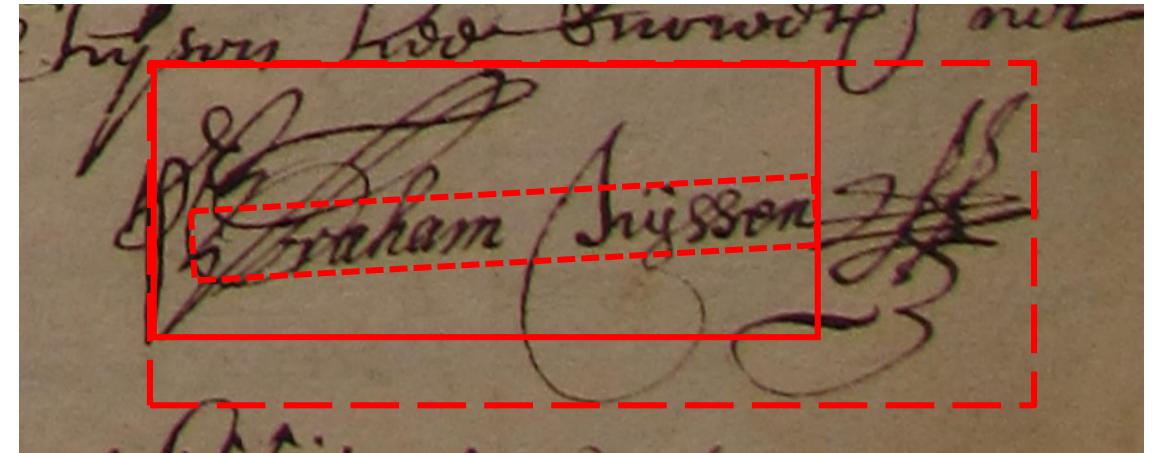
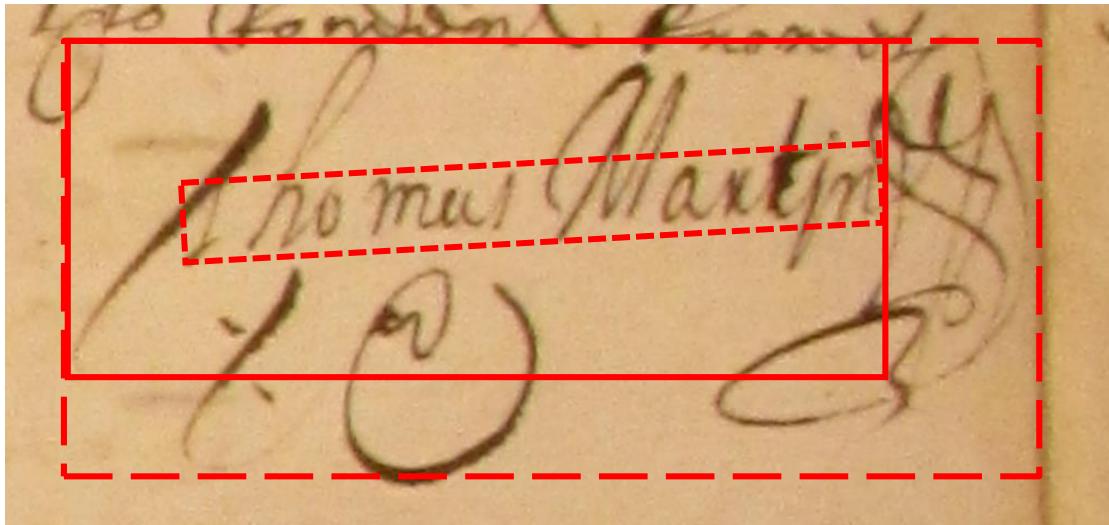
Outside boundary box: 12.75 x 5.75

Rotation from horizontal: ca. 340 degrees

Different visual geometries of signatures

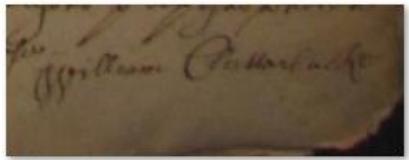


Visual geometries of flourishes – C17th Irish, Dutch, English & Moroccan merchants

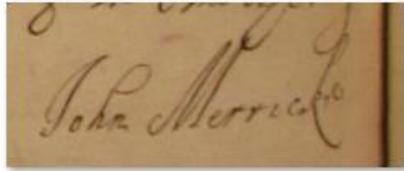


Source: Clockwise from top LH side: KaggleTestSnippet_HCA_1368_f.34v.PNG, KaggleTestSnippet_HCA_1370_f.366r.PNG, KaggleTestSnippet_HCA_1370_f.134r.PNG, KaggleTestSnippet_HCA_1368_f.58r.PNG

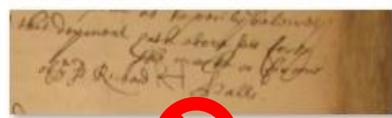
Challenge One: Identify the 11 image snippets on this page which contain signatures and highlight the 2 image snippets which contain signatures belonging to the same person



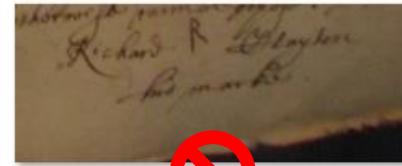
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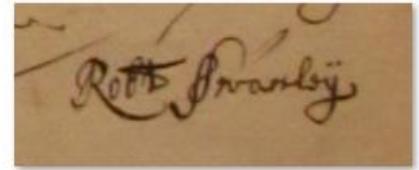
KaggleTestSnippet_HCA_1368_f.142r.PNG



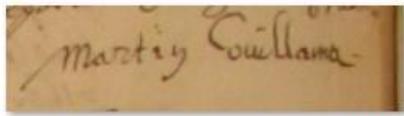
KaggleTestSnippet_HCA_1368_f.143r.PNG



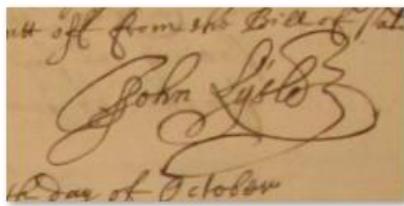
KaggleTestSnippet_HCA_1368_f.145r.PNG



KaggleTestSnippet_HCA_1368_f.148r.PNG



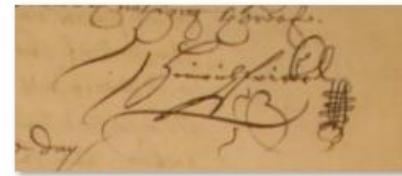
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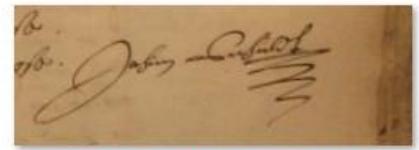
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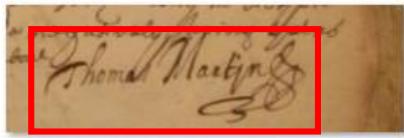
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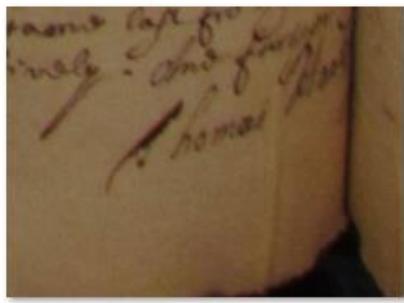
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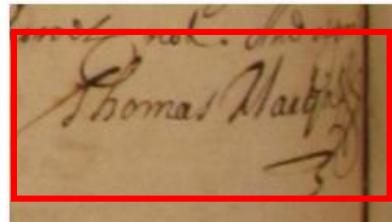
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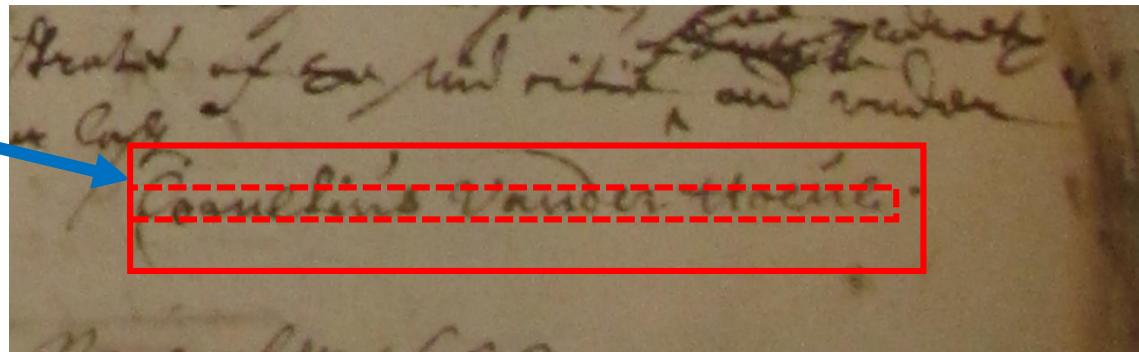


KaggleTestSnippet_HCA_1368_f.161v.PNG

Challenge Two: Detect a London based merchant, who has Dutch origin, from physical characteristics of signature, rather than spelling of name

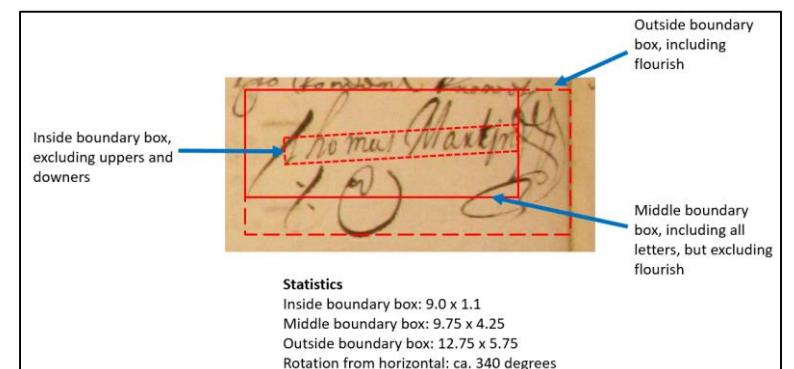
Semantic giveaways

- 3 names, not 2
- Specific names
["Cornelius"; "Vander";
"Hoene"]

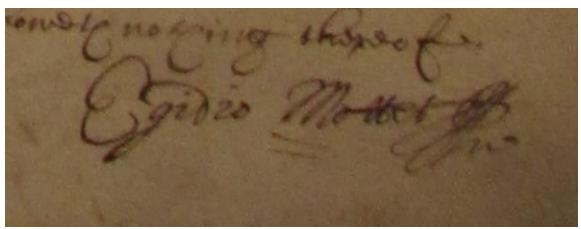
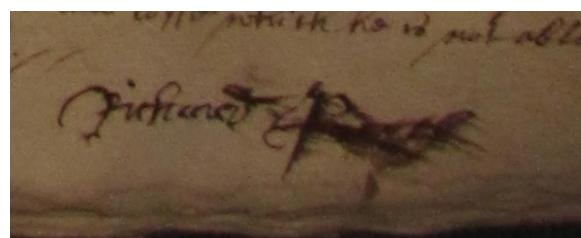
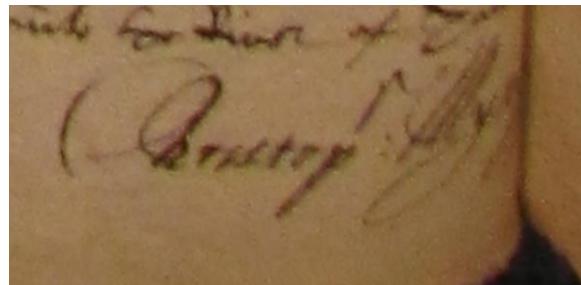
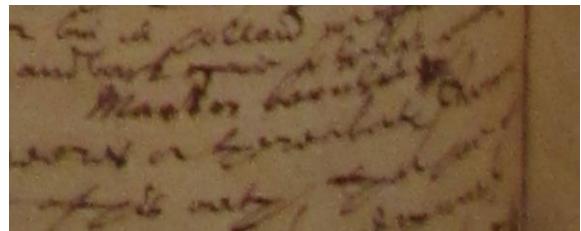


Physical giveaways

- Long, narrow signature
- No flourish
- Limited capitalisation
- Middle bounding box close to inner bounding box, with no outside bounding box



Research question - methodology: How will poor resolution imagery affect the ability of a machine to learn from an image?



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Computer Science > Computer Vision and Pattern Recognition

Understanding How Image Quality Affects Deep Neural Networks

Samuel Dodge, Lina Karam

(Submitted on 14 Apr 2016 (v1), last revised 21 Apr 2016 (this version, v2))

Image quality is an important practical challenge that is often overlooked in the design of machine vision systems. Commonly, machine vision systems are trained and tested on high quality image datasets, yet in practical applications the input images can not be assumed to be of high quality. Recently, deep neural networks have obtained state-of-the-art performance on many machine vision tasks. In this paper we provide an evaluation of 4 state-of-the-art deep neural network models for image classification under quality distortions. We consider five types of quality distortions: blur, noise, contrast, JPEG, and JPEG2000 compression. We show that the existing networks are susceptible to these quality distortions, particularly to blur and noise. These results enable future work in developing deep neural networks that are more invariant to quality distortions.

Comments: Final version will appear in IEEE Xplore in the Proceedings of the Conference on the Quality of Multimedia Experience (QoMEX), June 6-8, 2016

Subjects: Computer Vision and Pattern Recognition (cs.CV)

Cite as: arXiv:1604.04004 [cs.CV]

(or arXiv:1604.04004v2 [cs.CV] for this version)

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Lina J. Karam

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Source: Clockwise from top LH side:

KaggleTestSnippet_HCA_1368_f.42r.PNG,

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KaggleTestSnippet_HCA_1368_f.55r_Two.PNG,

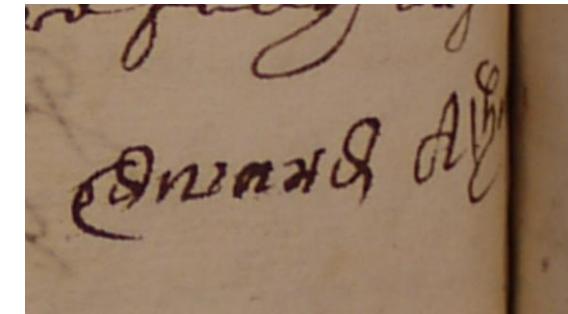
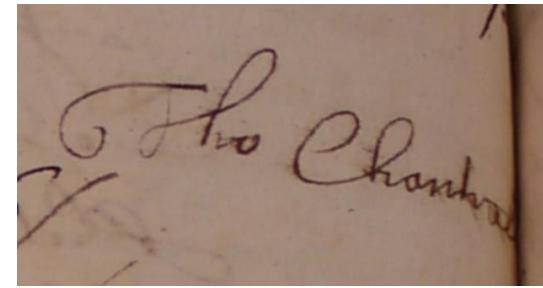
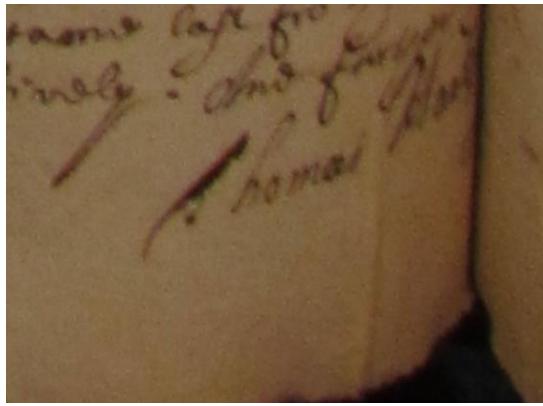
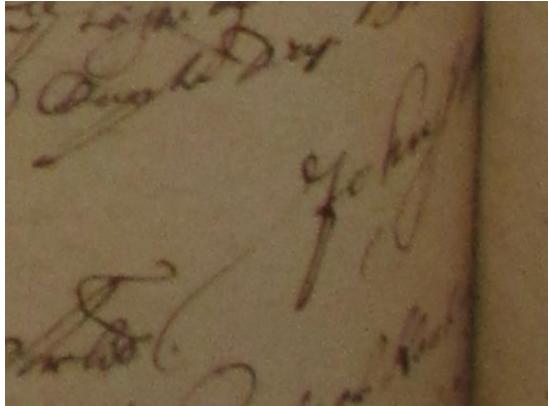
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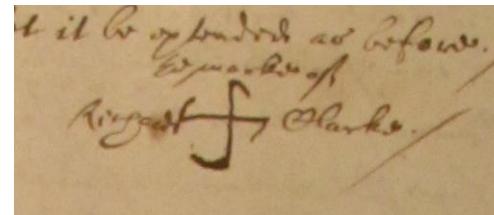
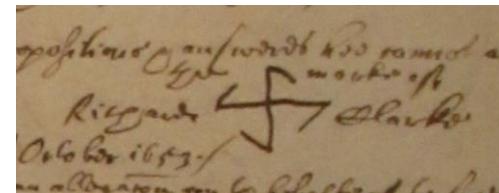
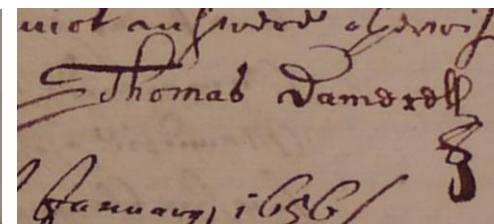
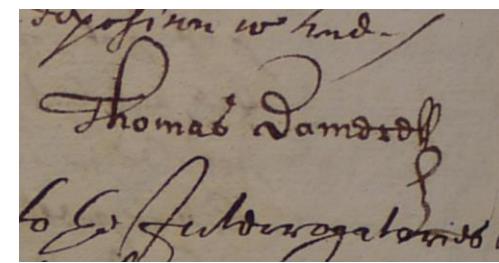
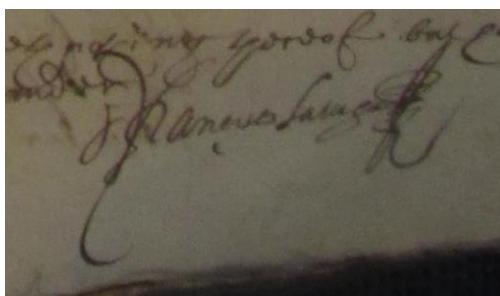
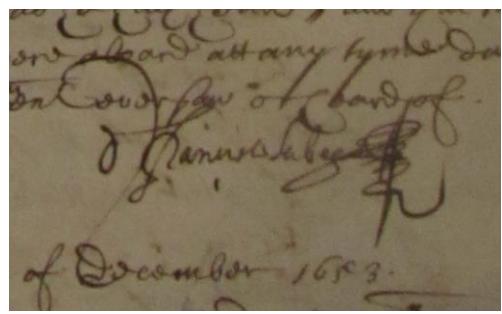
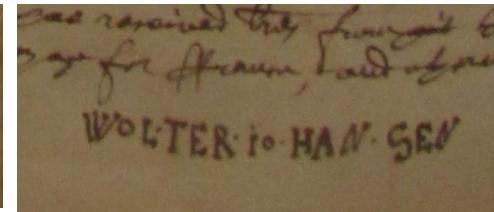
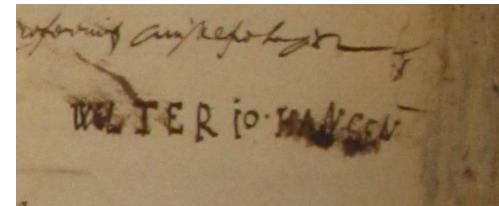
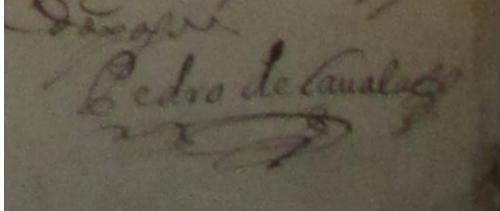
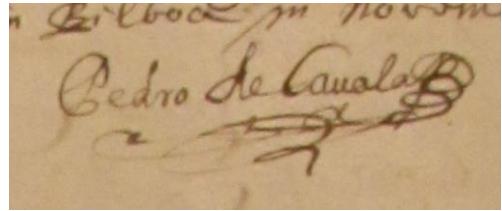
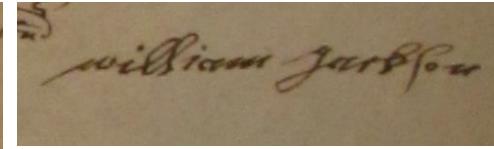
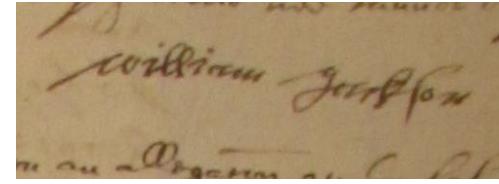
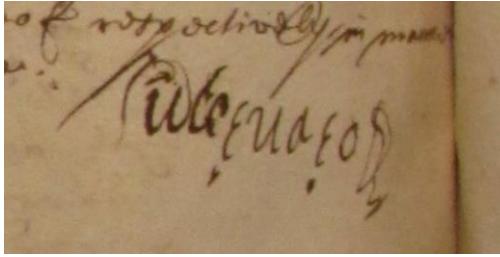
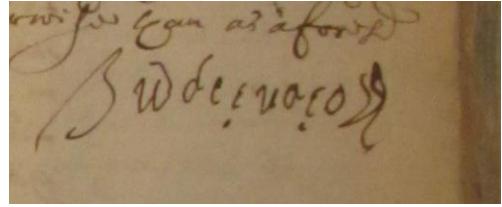
Research question - methodology: How much of a signature does a machine need to predict the physical character of the whole signature & to assess it stylistically?



Source: Clockwise from top LH side: KaggleTestSnippet_HCA_1368_f.274v.PNG, KaggleTestSnippet_HCA_1368_f.159v.PNG, KaggleTestSnippet_HCA_1373_f.490v.PNG, KaggleTestSnippet_HCA_1373_f.493v.PNG,

Research question - methodology: How well will machine learning cope with recognising and matching signature, initial & mark snippets? (1)

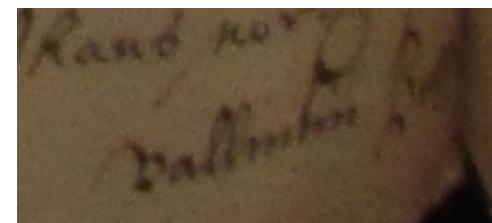
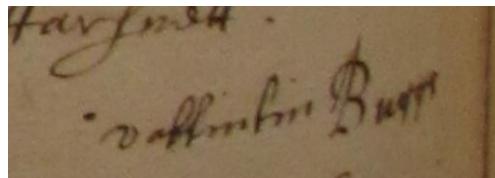
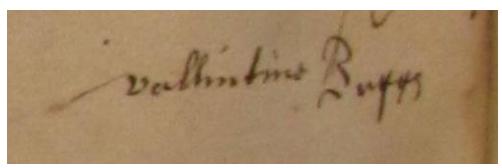
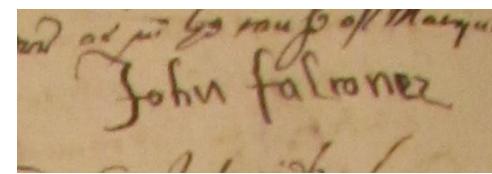
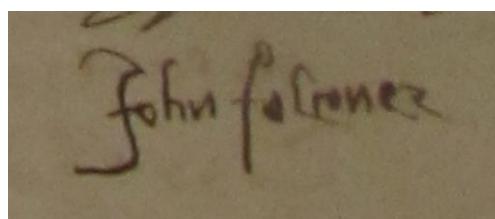
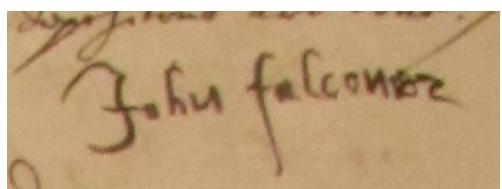
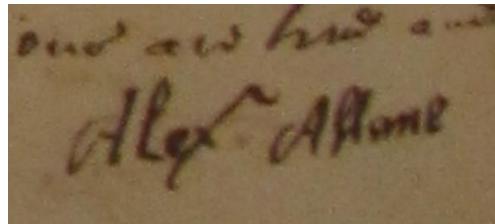
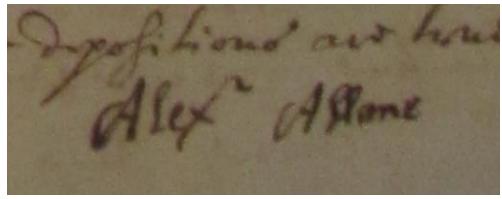
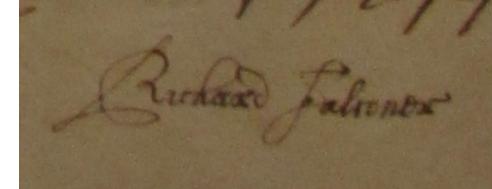
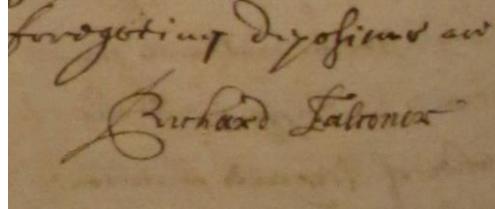
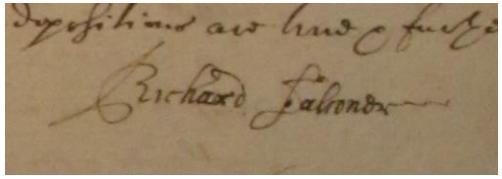
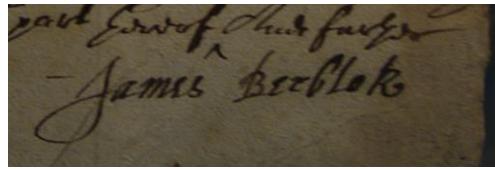
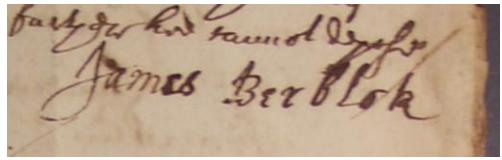
Are certain parts of a signature more stable than others?



Source: In pirs, from top LH side downwards, then from top RH side downwards: (1) KaggleTestSnippet_HCA_1368_f.253r.PNG, KaggleTestSnippet_HCA_1368_f.254v.PNG; (2) KaggleTestSnippet_HCA_1368_f.255v.PNG, KaggleTestSnippet_HCA_1368_f.256r.PNG; (3) KaggleTestSnippet_HCA_1368_f.257r.PNG, KaggleTestSnippet_HCA_1368_f.258r.PNG; (4) KaggleTestSnippet_HCA_1368_f.283r.PNG, KaggleTestSnippet_HCA_1368_f.284r.PNG; (5) KaggleTestSnippet_HCA_1368_f.231r.PNG, KaggleTestSnippet_HCA_1368_f.239v.PNG (6) KaggleTestSnippet_HCA_1371_f.481v.PNG, KaggleTestSnippet_HCA_1371_f.484r.PNG (7) KaggleTestSnippet_HCA_1368_f.278r.PNG, KaggleTestSnippet_HCA_1368_f.279r.PNG

Research question - methodology: How well will machine learning cope with recognising and matching signature, initial & mark snippets? (2)

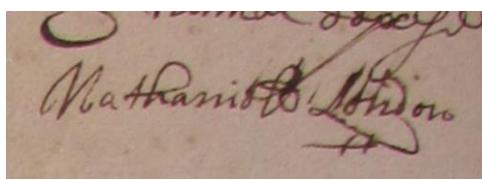
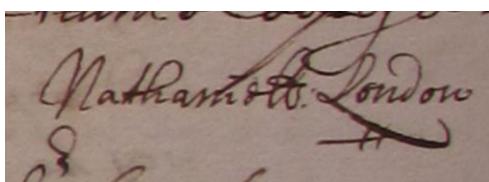
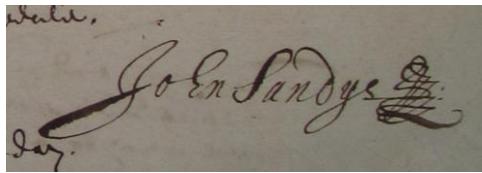
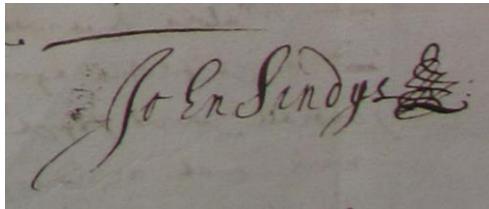
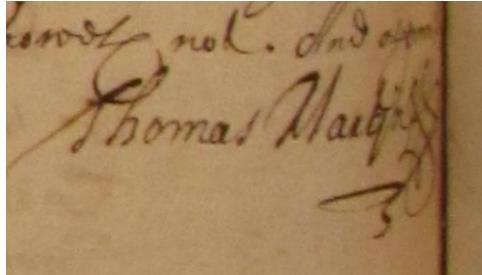
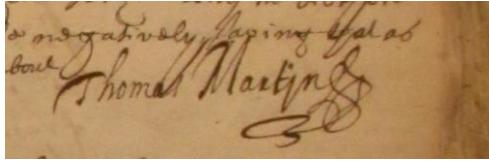
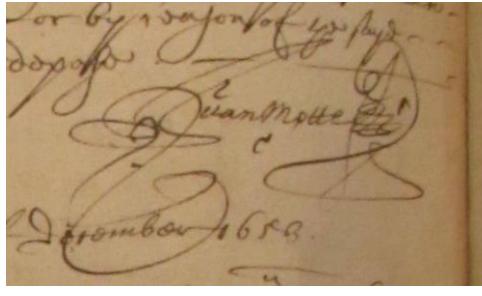
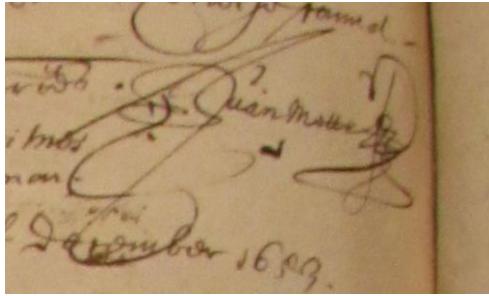
Are certain parts of a signature more stable than others?



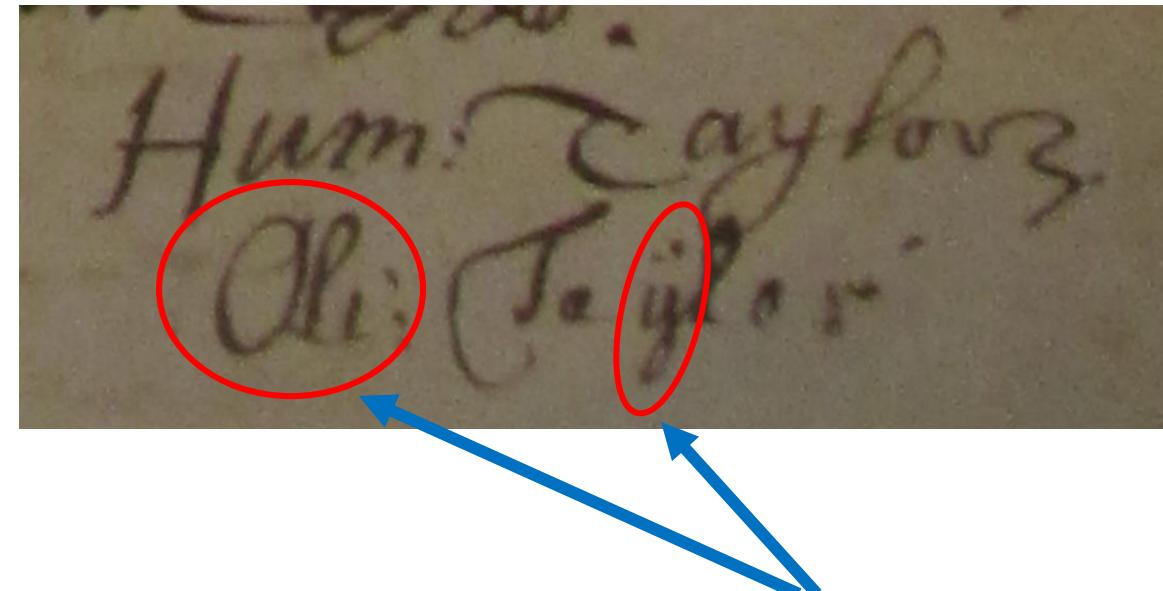
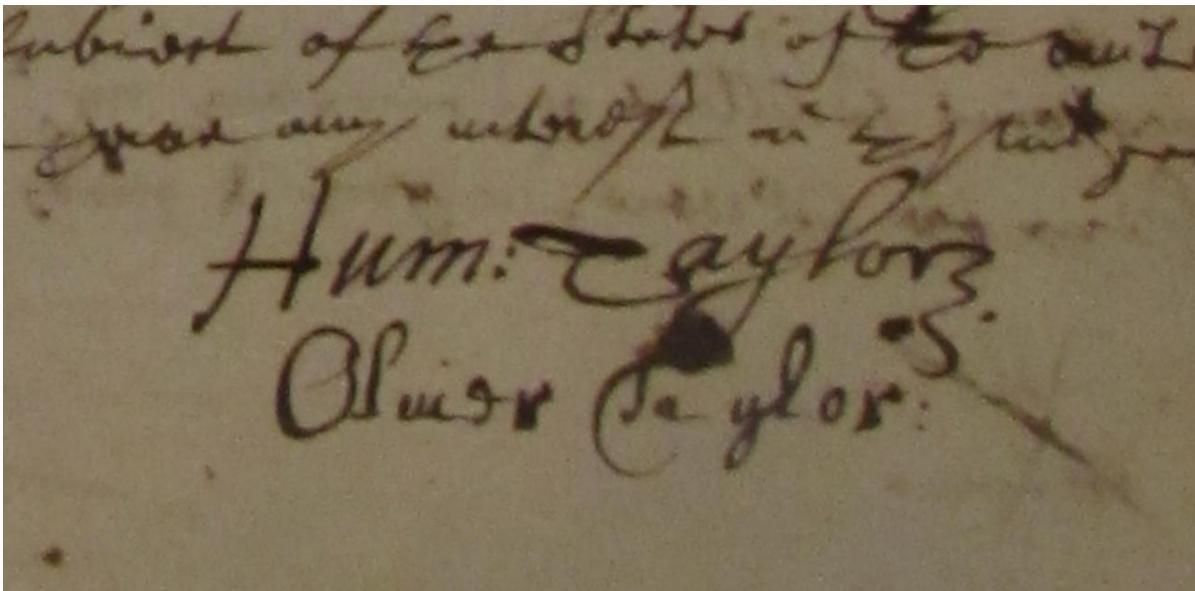
Source: In pairs, from top LH side downwards, then from top RH side downwards: (1) KaggleTestSnippet_HCA_1373_f.16r_One.PNG, KaggleTestSnippet_HCA_1373_f.16r_Two.PNG (2) KaggleTestSnippet_HCA_1368_f.288r.PNG, KaggleTestSnippet_HCA_1368_f.288v.PNG, KaggleTestSnippet_HCA_1368_f.291v_Two.PNG (3) KaggleTestSnippet_HCA_1368_f.289r.PNG, KaggleTestSnippet_HCA_1368_f.289v.PNG (4) KaggleTestSnippet_HCA_1368_f.290v.PNG, KaggleTestSnippet_HCA_1368_f.291r.PNG, KaggleTestSnippet_HCA_1368_f.291v_One.PNG (5) KaggleTestSnippet_HCA_1368_f.293v_One.PNG, KaggleTestSnippet_HCA_1368_f.293v_Two, KaggleTestSnippet_HCA_1368_f.293v_Three

Research question - methodology: How well will machine learning cope with recognising and matching signature, initial & mark snippets? (3)

Are certain parts of a signature more stable than others?



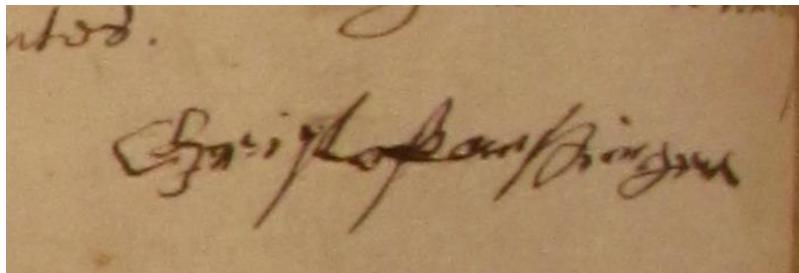
Research question - content: Can a family resemblance be detected in signatures from the same biological family from the same date and place?



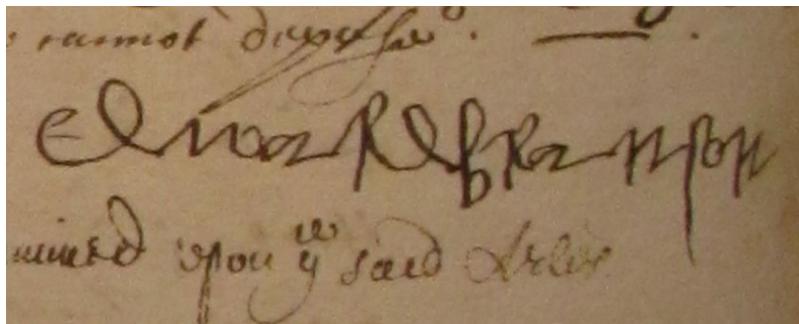
Depositions in the English High Court of Admiralty of **Humphrey Taylor** of London merchant aged 29 yeares or thereabouts and **Oliver Taylor** of the same citie merchant aged 27 yeares, dated December 8th, 1653 and again on December 9th, 1653

One day after his first signature, **Oliver Taylor** abbreviates his first name and writes the "y" in "Taylor" with a diaeresis ("ÿ")

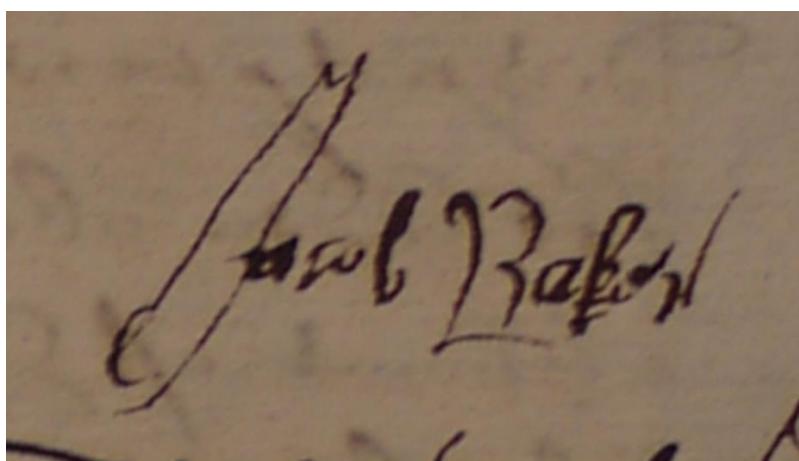
Research question - content: Is there an age effect in terms of physical control of pen, independent of any age-independent physical infirmity, and independent of a tendency for lower literacy (and possibly lower control of pen) amongst earlier age cohorts in our samples of signatures from the mid-C17th?



Christopher Drake, 86 year old sugar refiner, of Saint Mary Street, London, born 1567, signature dated Nov 2, 1653



Edward Branston, 47 year old rope maker, of Saint Mary Matsellon alias Whitechapel, born 1607, signature dated Jan 25, 1654



James Baker, 21 year old mariner, of Wapping, one of the company of the ship the *Plaine Dealeing*, born 1635, signature dated Jun 21, 1656

Research question - content: Was it less common to use capital letters in Dutch rather than English language signatures in the C17th?

Steven pieterse

Bonifacius van der Deyppen.
Lars & Albertus
of October 1653.

John Deyppen.
Jacob Colmaes den jonghe

My son John Snowdon our
Graham Sijssen

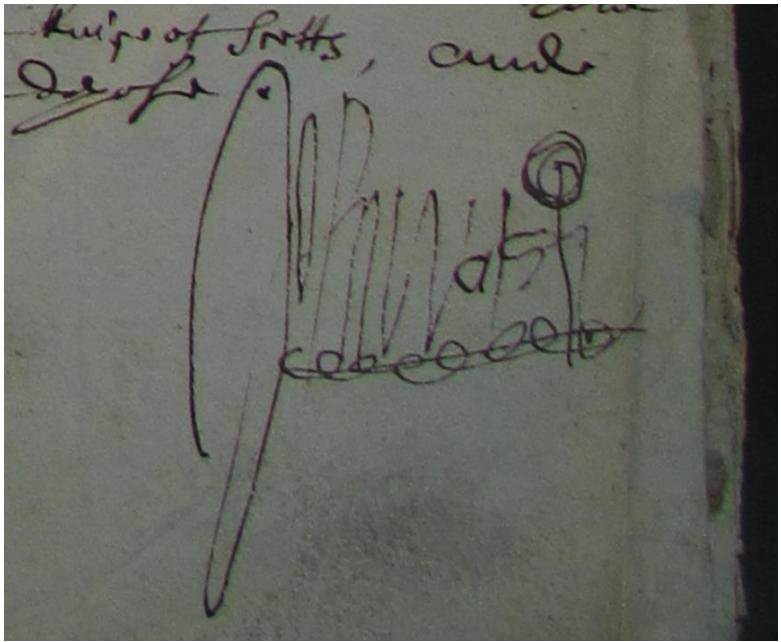
No name, ~~Colman~~
living bakstane

Another being as aforesaid
commissary mercer to

for having as aforesaid
Abraham Van Dinter
November 1659.

Another name another
Van Romant
of December 1659.

Data: Unusual signatures



SUPPLEMENTARY MATERIAL

Issues

Pre-processing

- Scaling images
- Converting to grayscale
 - Some image processing & computer vision algorithms use grayscale images not colour images
 - Grayscale processing 3x faster than colour processing
- Normalising an image
 - Avoid larger feature values dominating smaller feature values [THINK ABOUT THIS]

Image processing packages

- [OpenCV](#): reads & plots an image in BGR format. Reads PNG & JPG on 0 to 255 range
- [Matplotlib](#): reads & plots an image in RGB format. Reads JPEG in 0 to 255 and PNG on 0 to 1 range

Do images need to be square for typical neural network models? Or at least have identical aspect ratios? Do we need to scale all images to a standard number of pixels for height & width? Do snippets need to be cropped to isolate the signoff? What does the mean image of a marke, an initial and a signature look like? [mean value of each pixel across all training examples]. Can also look at the standard deviation of the pixels for a group of images.

Reading

Colin Greenstreet, Pattern recognition of signatures and marks in historical manuscripts as the basis for sub-population recognition, March 2018 [available Signsoliteracy Github repository: Signsoliteracy/Signoff]

Colin Greenstreet, C17th alphabet of initials, 4th edn., April 4th, 2018 [available Signsoliteracy Github repository: Signsoliteracy/Signoff]

[Mark Hailwood, 'The Rabble that Cannot Read', Ordinary Peoples Literacy in Seventeenth-Century England, October 13th, 2014](#)

[David Cressy, Literacy and the Social Order: Reading & Writing in Tudor and Stuart England, 1980](#)

Reading

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Understanding How Image Quality Affects Deep Neural Networks

Samuel Dodge, Lina Karam

(Submitted on 14 Apr 2016 (v1), last revised 21 Apr 2016 (this version, v2))

Image quality is an important practical challenge that is often overlooked in the design of machine vision systems. Commonly, machine vision systems are trained and tested on high quality image datasets, yet in practical applications the input images can not be assumed to be of high quality. Recently, deep neural networks have obtained state-of-the-art performance on many machine vision tasks. In this paper we provide an evaluation of 4 state-of-the-art deep neural network models for image classification under quality distortions. We consider five types of quality distortions: blur, noise, contrast, JPEG, and JPEG2000 compression. We show that the existing networks are susceptible to these quality distortions, particularly to blur and noise. These results enable future work in developing deep neural networks that are more invariant to quality distortions.

Comments: Final version will appear in IEEE Xplore in the Proceedings of the Conference on the Quality of Multimedia Experience (QoMEX), June 6-8, 2016

Subjects: Computer Vision and Pattern Recognition (cs.CV)

Cite as: arXiv:1604.04004 [cs.CV]
(or arXiv:1604.04004v2 [cs.CV] for this version)

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[v2] Thu, 21 Apr 2016 20:44:52 GMT (2833kb,D)

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Labeled Faces in the Wild Home



NEW SURVEY PAPER:

Erik Learned-Miller, Gary B. Huang, Aruni RoyChowdhury, Haoxiang Li, and Gang Hua.

Labeled Faces in the Wild: A Survey.

In *Advances in Face Detection and Facial Image Analysis*, edited by Michal Kawulok, M. Emre Celebi, and Bogdan Smolka, Springer, pages 189-248, 2016.

[[Springer Page](#)] [[Draft pdf](#)]

NEW RESULTS PAGE:

WE HAVE RECENTLY UPDATED AND CHANGED THE FORMAT AND CONTENT OF OUR [RESULTS PAGE](#). PLEASE REFER TO THE [NEW TECHNICAL REPORT](#) FOR DETAILS OF THE CHANGES.

Welcome to Labeled Faces in the Wild, a database of face photographs designed for studying the problem of unconstrained face recognition. The data set contains more than 13,000 images of faces collected from the web. Each face has been labeled with the name of the person pictured. 1680 of the people pictured have two or more distinct photos in the data set. The only constraint on these faces is that they were detected by the Viola-Jones face detector. More details can be found in the technical report below.

There are now four different sets of LFW images including the original and three different types of "aligned" images. The aligned images include "funneled images" (ICCV 2007), LFW-a, which uses an unpublished method of alignment, and "deep funneled" images (NIPS 2012). Among these, LFW-a and the deep funneled images produce superior results for most face verification algorithms over the original images and over the funneled images (ICCV 2007).

Related:

[[new](#)] [Collected resources related to LFW](#) - updated 2017/05/09.

[LFW Deep Funneled Images](#).

[LFW attributes file](#) (see [Attribute and Simile Classifiers for Face Verification](#), Kumar et al.).

[Face Detection Data set and Benchmark \(FDDB\)](#), our new database for face detection research.

[Faces in Real-Life Images](#) workshop at the [European Conference on Computer Vision 2008](#), run by Erik Learned-Miller, Andras Ferencz, and Frederic Jurie.

Reading

Labeled Faces in the Wild: A Survey

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Abstract In 2007, Labeled Faces in the Wild was released in an effort to spur research in face recognition, specifically for the problem of face verification with unconstrained images. Since that time, more than 50 papers have been published that improve upon this benchmark in some respect. A remarkably wide variety of innovative methods have been developed to overcome the challenges presented in this database. As performance on some aspects of the benchmark approaches 100% accuracy, it seems appropriate to review this progress, derive what general principles we can from these works, and identify key future challenges in face recognition. In this survey, we review the contributions to LFW for which the authors have provided results to the curators (results found on the LFW results web page). We also review the cross cutting topic of alignment and how it is used in various methods. We end with a brief discussion of recent databases designed to challenge the next generation of face recognition algorithms.

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Reading

Siamese Convolutional Neural Networks for Authorship Verification

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Abstract

Determining handwriting authorship of a written text has practical significance in the realm of forensics, signature verification, and literary history. While there have been studies in signature verification and handwriting classification, a vast literature review reveals that very little work has been done in handwriting verification. Recent advances in convolutional architectures, particularly those involving facial verification, suggest that the task can be tackled effectively. In this study, we build a Siamese convolutional neural network to determine whether two pieces of handwriting are written by the same author. We examine questions such as whether long pieces of handwriting must be present to achieve good results, how many samples are needed, what features are important, and how different architectures perform on this task. We explore different convolutional architectures like VGG, GoogLeNet and ResNet, to determine which architecture produces the best encoding of each sample. We note that our best performing single model, TinyResNet, achieves a 92.08% accuracy on the held out test set.

1. Introduction

Determining the authorship of a written text has practical significance in the realm of forensics, signature verification, and literary history [3]. In manuscript analysis, for instance, historians frequently ask questions regarding the number of authors for a text, whether an anonymous work can be confidently attributed to a historical figure, and what time period a text might be from. These kinds of analyses are all based upon comparisons between different writing samples [1]. Techniques in the field have remained largely subjective, however, making the transition to automatic tools difficult.

In addition, handwriting analysis is an established area of study in forensics, but there has not yet been any formal experiments measuring the accuracy of such analysis. As a result, the field is surrounded by much skepticism because of how subjective the process is (compared to, say, DNA testing) [5]. In addition, forensic handwriting analysis is time-intensive and requires two years of training for a person to obtain proper qualifications. The primary objective of this project is to develop an automatic, high-accuracy system which can determine if any two writing samples are written by the same person. In addition, our system should be able to handle authors it has never encountered before.

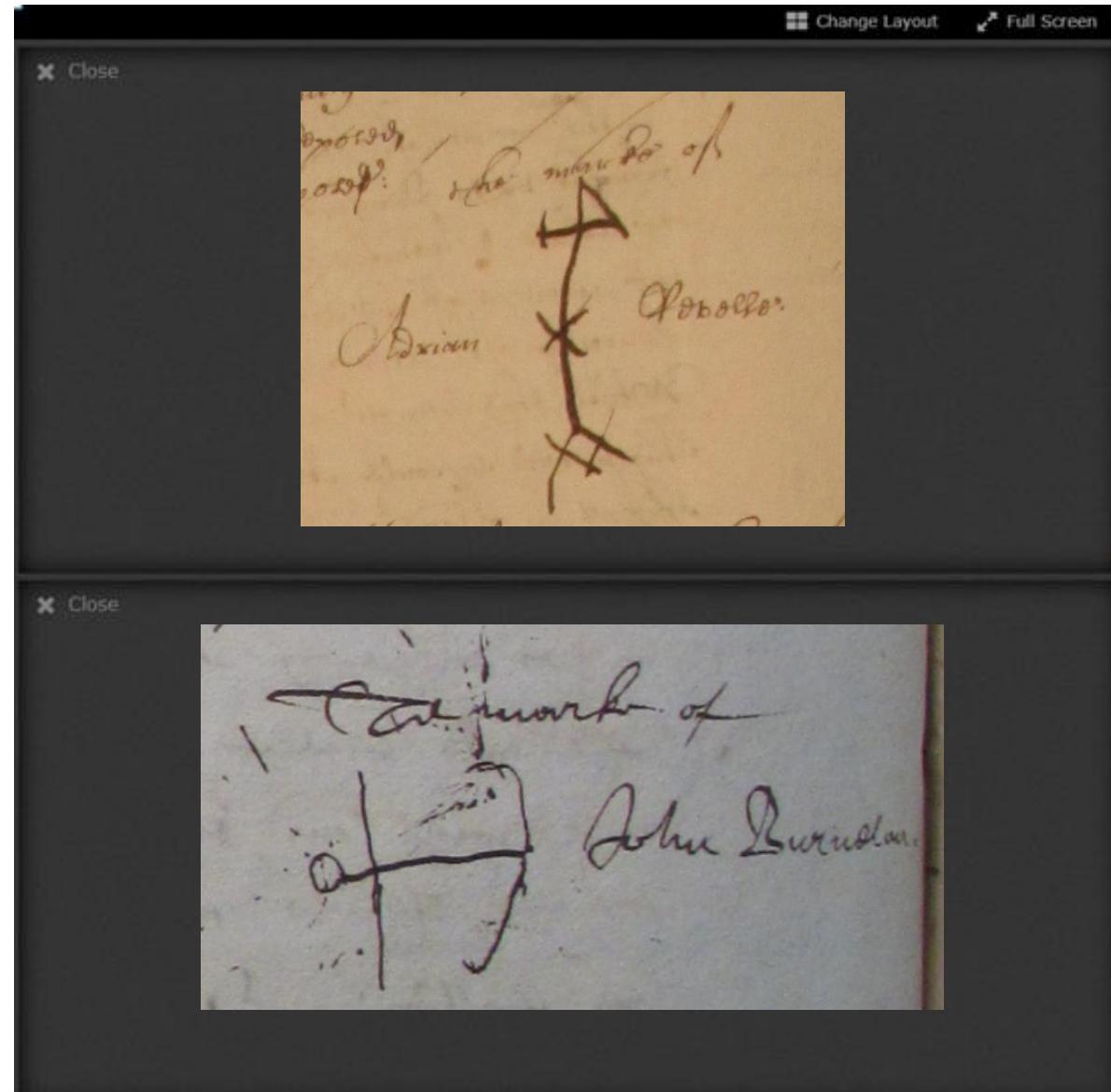
2. Background and Related Work

Our objective fits well with the Siamese CNN neural network architecture, which was first developed in 1993 to tackle the signature verification problem. [3] This type of architecture takes in two inputs and outputs a distance metric for the inputs. Bromley et al. was able to detect 95% of genuine signatures using this architecture. However, note that the signature verification problem expects a pair of inputs to be very similar to each other to be considered a match. This setup would not be effective for the problem we are trying to tackle, because our system should be agnostic to the actual text in a writing sample.

Other researchers have focused more closely on the authorship identification problem. A study in 2015 by Xing et al. reported an accuracy of 97% in classifying English writing samples for 657 authors. [11] They used the same dataset we will be using in this paper, the IAM Handwriting Database, and a 4-layer CNN. This study gave us confidence that we can achieve high accuracies on authorship problems using the IAM dataset. In a very recent research study from 2016, Yang et al. was able to achieve a 95% accuracy in classifying the authors for Chinese text samples,

Potential tool: conjoint analysis IIIF viewer plugin

The screenshot shows a browser extension for the David Rumsey Map Collection. At the top, it says "David Rumsey Map Collection - MapTab" with a "ADD TO CHROME" button. Below that is a map of the United States with a red overlay showing a specific location. The text "7:44 AM" is overlaid on the map. Below the map are tabs for "OVERVIEW", "REVIEWS", "SUPPORT", and "RELATED". The "RELATED" tab is active, showing thumbnails of other maps. At the bottom, there's a "Self-Portrait Dedicated to Paul Gauguin" by Vincent van Gogh.



Adrian Revele,
twenty-three year
old mariner, of
Dunquirke in
fflanders, November
12th, 1653; “hee
only speaketh the
flemish speech”
(HCA 13/68 f.183v)

John Burnelau,
twenty-eight year
old sailor, of Mornar,
France, March 30th,
1661 (HCA 13/73
f.486v)