

Hand-Drawn Looking Charts

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Abstract

Charts have long been a staple tool for data visualisation. However, traditional visuals rely almost exclusively on crisp, rigid lines that can inadvertently imply a misleading degree of absolute precision. This survey explores the characteristics, use, and application of hand-drawn looking charts in visual data representations. In particular, it gives an overview of various tools which can be used to create these visualisations, and provides recommendations on which tools are more effective in different contexts.

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Chapter 1

Introduction

Creating effective visual representations of data is a central goal of information visualisation. Traditional visualisation techniques typically prioritize clarity and accuracy, following widely accepted rules in visualisation design. Hand-drawn visualisations have long been associated with informal reasoning, creativity, and early-stage exploration. As outlined by Walny et al. [2015], studies on sketching and diagramming suggest that such representations can support idea generation and make visualisations feel more approachable and engaging. At the same time, advances in digital tools have made it possible to recreate hand-drawn aesthetics in computational visualisations, combining expressive style with the scalability of modern visualisation systems.

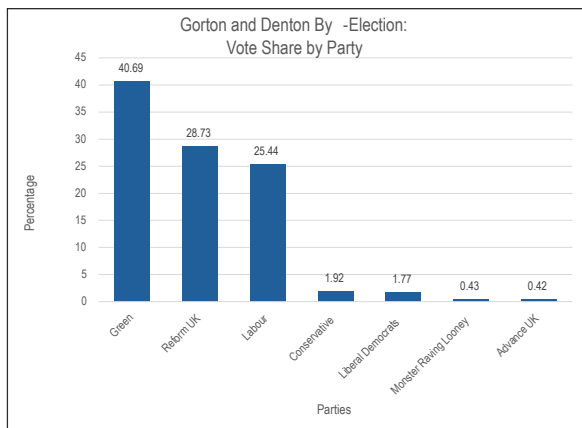
Despite growing interest in this area, there is limited consolidated understanding of the tools available for creating hand-drawn-style charts, how they are applied in practice, and when their use is most appropriate. Existing discussions are often scattered across different domains, including visualisation research, design, and human-computer interaction.

A defining characteristic of hand-drawn looking charts is their intentional visual roughness and apparent lack of geometric precision. Unlike traditional visualisations, which prioritise clean lines and exact alignment, these charts incorporate irregular, uneven strokes that mimic the appearance of freehand drawing. This includes the use of rough, sketch-like outlines, slight distortions in shapes, and variations in line thickness. This visual imperfection is not incidental, but is deliberately introduced to imitate the characteristics and looks of manual sketches. By simulating hand-drawn features, such charts create a sense of spontaneity and human involvement, which can influence how viewers interpret the visualisation.

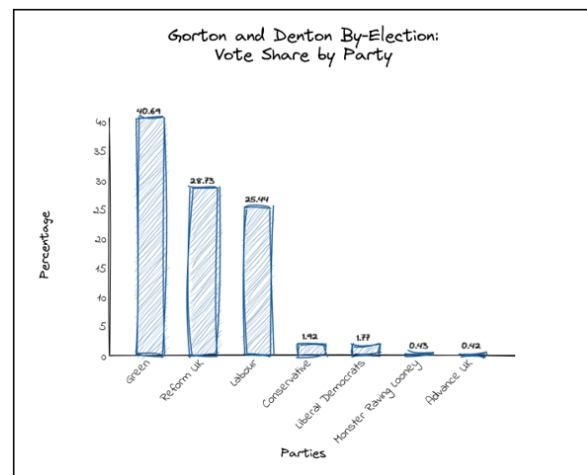
Hand-drawn looking charts are not limited to a specific visualisation type, but can be applied across a wide range of standard chart forms. Common examples include bar charts, line charts, and pie charts, which are adapted to incorporate sketch-like visual characteristics. In these cases, the underlying data structure and encoding remain consistent with traditional representations, while the visual style is modified to appear hand-drawn. Typically, the hand-drawn aesthetics function as a stylistic layer rather than a fundamentally different visualisation technique [Wood et al. 2012].

There are a number of possible motivations behind the use of hand-drawn looking charts in visualisation design:

- *Grab attention:* A key motivation is their ability to attract and sustain viewer attention. Compared to conventional chart designs, the irregular and sketch-like appearance of hand-drawn visuals introduces novelty, which can make them more visually engaging [Walny et al. 2015; Song et al. 2026] in contexts such as presentations, exploratory analysis, and educational materials.
- *Resist the impression of absolute truth:* Another important motivation is their ability to reduce the perception of absolute certainty often portrayed with highly refined and precise visualisations. While traditional charts may suggest a sense of authority and exactness, hand-drawn styles introduce a degree of ambiguity and lack of credibility through their informal appearance [Song et al. 2026],



(a) Bar chart: Precise style.



(b) Bar chart: Hand-drawn style.

Figure 1.1: Bar charts of the UK Gorton and Denton by-election results from 26 Feb 2026. Data from MCC [2026]. [Chart (a) made in Excel and chart (b) made in DrawCharts by the authors.]

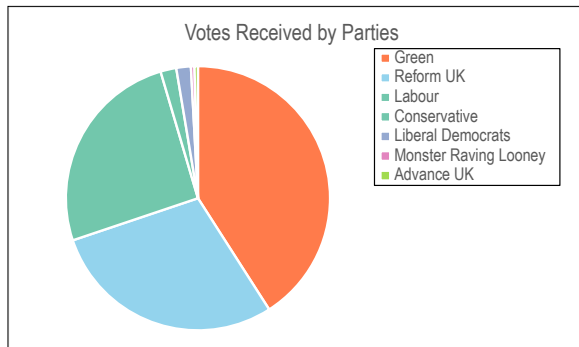
encouraging viewers to interpret the data more critically rather than accepting it as an unquestionable representation of truth.

- *Look approachable:* Finally, hand-drawn looking charts are often perceived as more approachable and less formal [Walny et al. 2015]. The casual visual style, characterised by rough lines and sketch-like elements, can lower the psychological barrier between the viewer and the data. This makes such charts particularly suitable for communication contexts where accessibility and engagement are prioritised over strict formal presentation [Song et al. 2026].

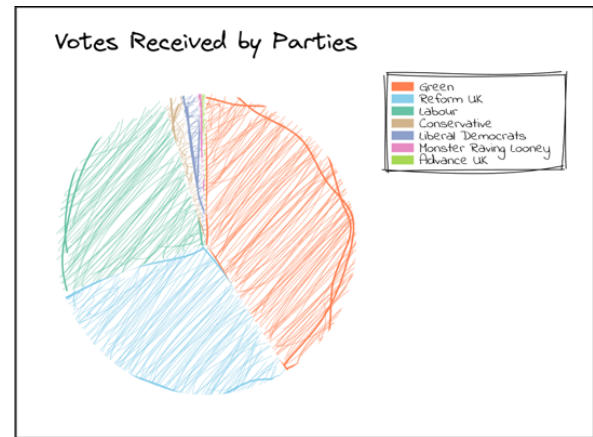
Three examples of applying hand-drawn looking aesthetics to common chart types are given here:

- *Bar Charts:* In their standard form, bar charts rely on precise geometric shapes with uniform widths, straight edges, and strict alignment to accurately encode quantitative values. In contrast, hand-drawn styled bar charts introduce visual irregularities such as uneven edges, slight misalignment, and variations in line thickness, as shown in Figure 1.1.
- *Pie Charts:* Pie charts can also be transformed into hand-drawn looking visualisations by replacing perfectly symmetrical segments with irregular, sketch-like divisions. Segment boundaries may appear uneven, while still preserving the proportional relationships between categories, as shown in Figure 1.2.
- *Line Charts:* Line charts in hand-drawn form retain the same temporal or sequential encoding as traditional line charts but replace smooth, continuous curves with irregular, freehand-like strokes. These rough line representations introduce small imperfections that mimic manual drawings, as shown in Figure 1.3.

This survey gives an overview of various tools which can be used to create hand-drawn looking visualisations, and provides recommendations on which tools are more effective in different contexts.

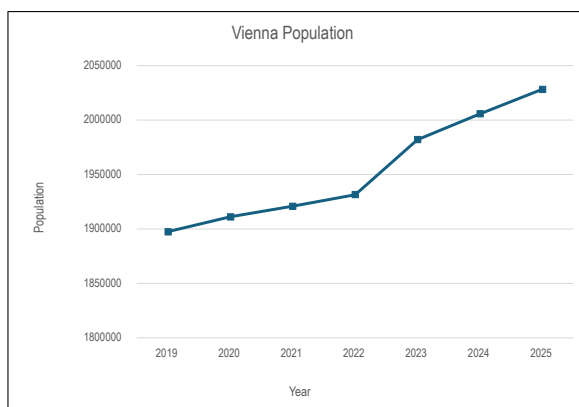


(a) Pie chart: Precise style.

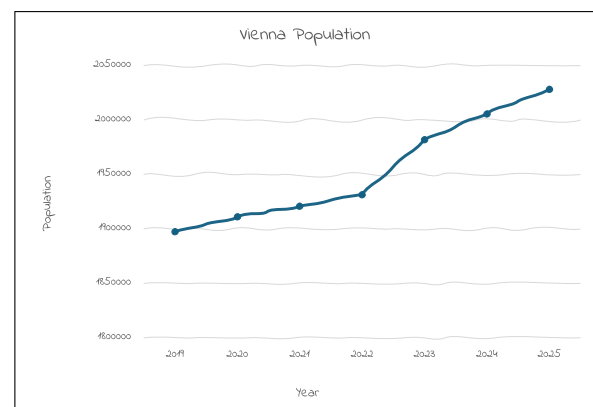


(b) Pie chart: Hand-drawn style.

Figure 1.2: Pie charts of the UK Gorton and Denton by-election results from 26 Feb 2026. Data from MCC [2026]. [Chart (a) made in Excel and chart (b) made in DrawCharts by the authors.]



(a) Line chart: Precise style.



(b) Line chart: Hand-drawn style.

Figure 1.3: Line charts of the population of Vienna from 2019 to 2025. Data from Vienna [2026]. [Charts (a) and (b) made in Excel by the authors.]

Chapter 2

Tools for Hand-Drawn Looking Charts

The creation of hand-drawn looking charts is supported by a wide range of tools which differ in their level of abstraction, flexibility, and intended user base. These tools include chart editors, specialist drawing tools, post-editing tools, programming libraries, and office applications like spreadsheets and presentation tools.

2.1 Chart Editors

Some chart editors, such as DrawCharts and Chartle, provide direct interfaces for generating hand-drawn-style charts with little setup required. These tools are primarily designed for users to quickly create sketch-style charts from structured data, often supporting data import and export functionality. Table 2.1 compares the features of DrawCharts and Chartle.

2.1.1 DrawCharts

DrawCharts is a free-to-use chart editor with a premium option. Hand-drawn style are enabled by default, as shown in Figure 2.1. DrawCharts has the following features:

- *Licence*: Free with a premium option costing € 2.99 per month or € 29 per year for additional features such as export to SVG and custom watermarks.
- *Change Roughness*: 10 levels of roughness to adjust the hand-drawn appearance.
- *Import Data*: CSV import is available in the premium version, allowing users to create charts from structured datasets.
- *Export Formats*: Supports export in JPEG and PNG formats, with SVG export available in the premium version.
- *Additional Features*: Users can adjust parameters such as background colour, background texture. Animation on hover is also supported, which adds interactivity to the charts like showing data labels on hover.
- *Limitations*: No customisation options for fill patterns, font family, y-axis range/step-size, and the free version does not support SVG export or data import, which may limit its utility for free users.

A showcase video describing DrawCharts is available [Manandhar and Nsofor 2026c].

	DrawCharts	Chartle
Change Roughness:	✓	✓
Toggle Hand-Drawn Look:	✓	✓
Fill Customisation:	✗	✓
Freehand Drawing:	✓	✓
Import CSV:	✓ [Premium]	✓
Export SVG:	✓ [Premium]	✗
Licence / Business Model:	Free/Premium	Free
Open Source:	✗	✗

Table 2.1: Comparison of chart editor features for hand-drawn looking charts.

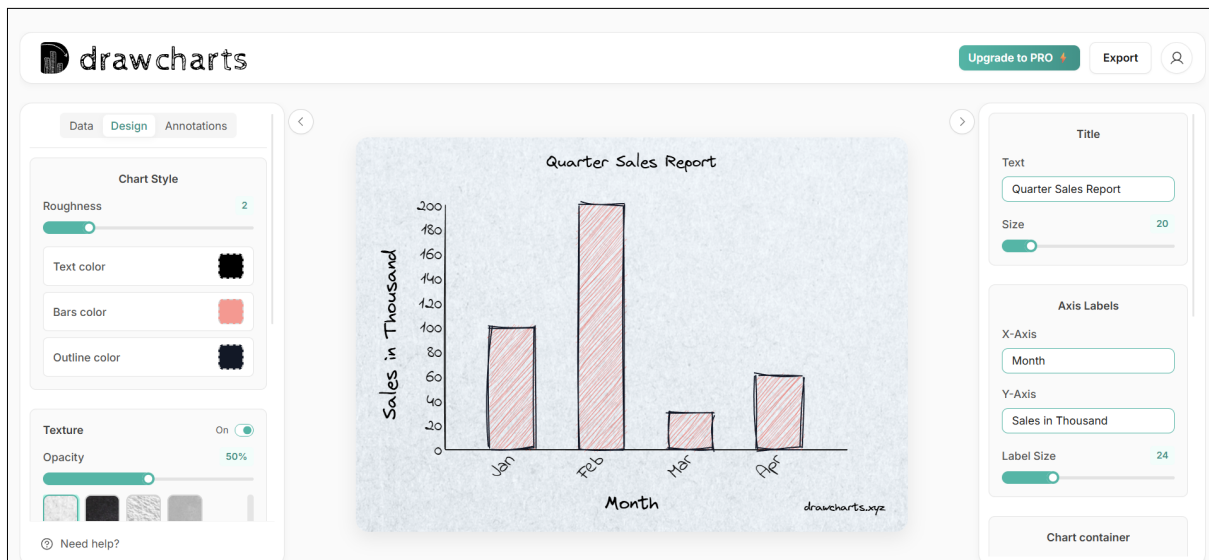


Figure 2.1: DrawCharts: User interface with roughness slider. A showcase video is available [Manandhar and Nsofor 2026c]. [Screenshot taken from DrawCharts by the authors.]

2.1.2 Chartle

Chartle is a free-to-use chart editor. Hand-drawn style is enabled using the Rough option, as shown in Figure 2.2. Chartle has the following features:

- *Licence:* Free to use with ads.
- *Change Roughness:* 10 levels of roughness to adjust the hand-drawn appearance.
- *Import Data:* CSV import is available, allowing users to create charts from structured datasets. CSV columns needed for the chosen chart type can be viewed in the Data tab, which also provides an interface for manual data entry and editing.
- *Export Formats:* Supports export in JPEG, PNG, and WebP formats.
- *Additional Features:* Users can customise fonts, data labels, title, y-axis range/step-size, fill style, and export in native chart format for future re-use.
- *Limitations:* Generated charts cannot be exported in SVG format.

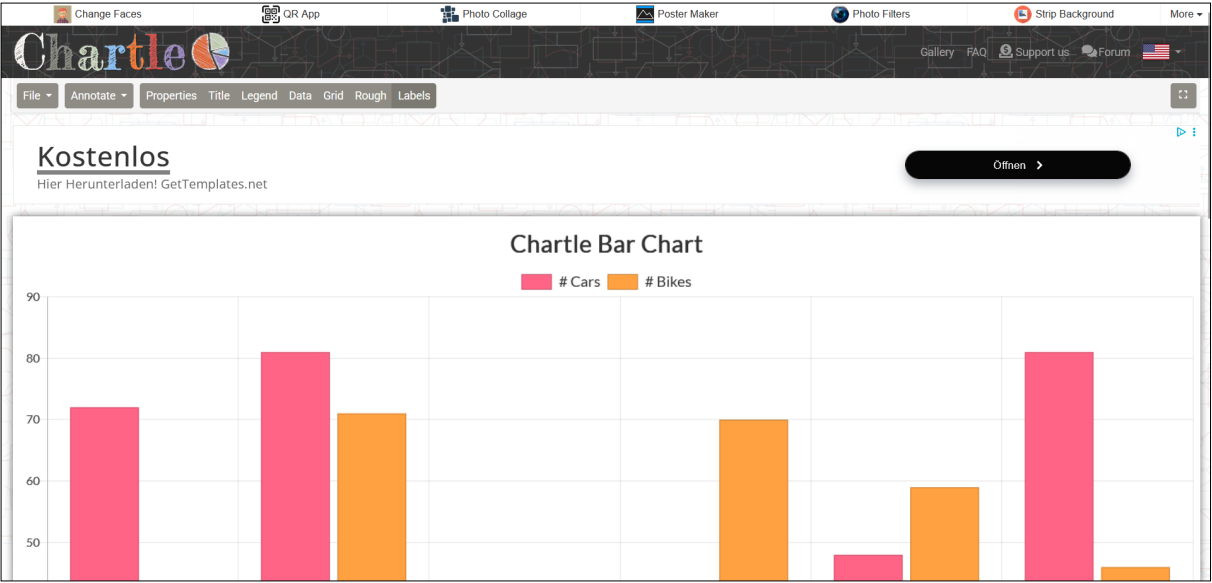


Figure 2.2: Chartle: User interface. A showcase video is available [Manandhar and Nsofor 2026a].
[Screenshot taken from Chartle by the authors.]

	draw.io	Excalidraw	tldraw
Change Roughness:	✓	✓	✗
Toggle Hand-Drawn Look:	✓	✓	✓
Export SVG:	✓	✓	✓
Freehand Drawing:	✓	✓	✓
Chart Library:	✗	✓	✗
Open Source:	✓	✓	✗

Table 2.2: Comparison of drawing tool features for hand-drawn looking charts.

A showcase video describing Chartle is available [Manandhar and Nsofor 2026a].

2.2 Drawing Tools

Drawing tools support the creation of hand-drawn looking charts by combining basic shapes and freeform drawing rather than automated chart generation by importing a dataset. Three such tools are discussed here: draw.io, Excalidraw, and tldraw. Table 2.2 compares their features.

2.2.1 draw.io

draw.io is free and open source. Its Sketch mode enables hand-drawn style, as shown in Figure 2.3. draw.io has the following features:

- *Licence:* Free to use and opensource.
- *Change Roughness:* Roughness can be changed with the Jitter property.
- *Additional Features:* Customise jiggle, hachure, mutistroke, etc. Change from Rough to Comic style. Save in .drawio format for future re-use.
- *Export Formats:* Supports export in SVG, PNG, JPEG formats.

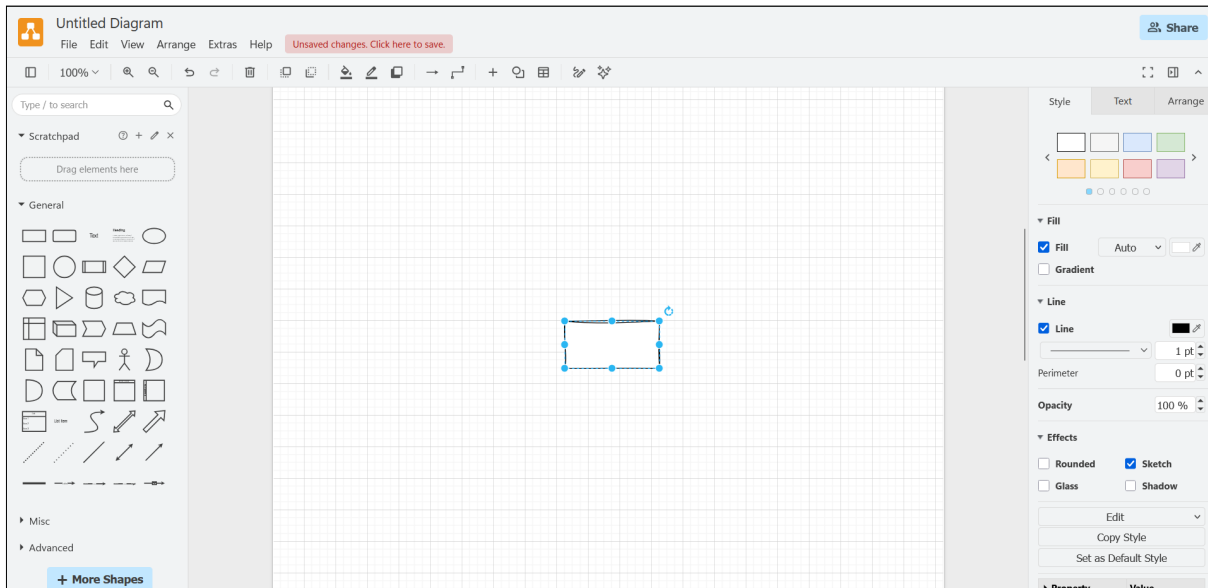


Figure 2.3: draw.io: User interface. A showcase video is available [Manandhar and Nsofor 2026b].
[Screenshot taken from draw.io by the authors.]

- *Limitations:* Complex charts are difficult to create if shapes need to be made using free-form drawing. A showcase video describing draw.io is available [Manandhar and Nsofor 2026b].

2.2.2 Excalidraw

Excalidraw is a free, open-source drawing tool, with a premium option. It is shown in Figure 2.4. Excalidraw has the following features:

- *Licence:* Free to use, with a premium option costing \$6 per month.
- *Change Roughness:* Roughness can be changed with Sloppiness option.
- *Additional Features:* Library capability with Data Viz library for charts with hand-drawn style. Save in .excalidraw format for future re-use.
- *Export Formats:* Supports export in SVG and PNG formats.
- *Limitations:* Few customisations are available for hand-drawn style. Complex charts are difficult to create if shapes need to be made using free-form drawing.

A showcase video describing Excalidraw is available [Manandhar and Nsofor 2026d].

2.2.3 tldraw

tldraw is a free illustration tool with very subtle hand-drawn style (as shown in Figure 2.5). It has following features:

- *Licence:* Free to use.
- *Change Roughness:* Roughness cannot be changed with "Dash-Draw" style applied by default.
- *Additional Features:* Users can customise fill of the shapes to dash.
- *Export Formats:* Supports export in SVG and PNG formats.
- *Limitations:* Fewer customisations available for hand-drawn style and complex charts are difficult to create if shapes need to be made using free-form drawing.

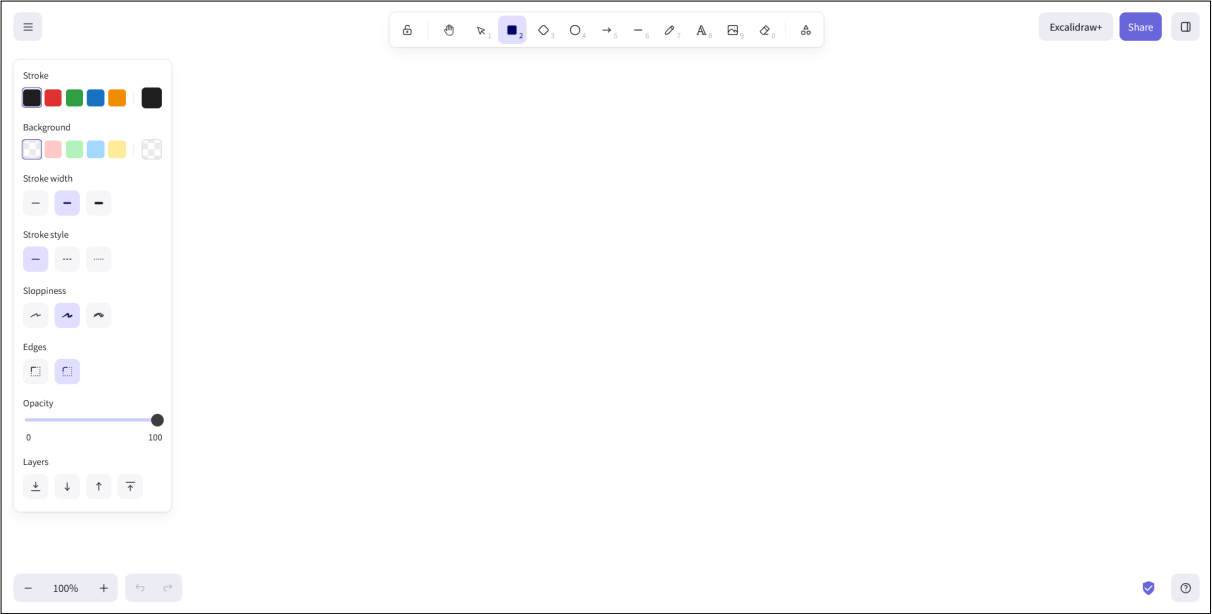


Figure 2.4: Excalidraw: User interface. A showcase video is available [Manandhar and Nsofor 2026d]. [Screenshot taken from Excalidraw by the authors.]

	Adobe Illustrator	Inkscape
Change Roughness:	✓	✓
Toggle Hand-Drawn Look:	✗	✗
Export SVG:	✓	✓
Freehand Drawing:	✓	✓
Predefined Shapes:	✓	✓
Open Source:	✗	✓

Table 2.3: Comparison of post-editing tool features for hand-drawn looking charts.

2.3 Post-Editing Tools

Some general-purpose illustration tools can be used in a post-editing step, to introduce hand-drawn aesthetics to a previously created chart, rather than generating them directly. Table 2.3 compares the features of Adobe Illustrator and Inkscape in terms of post-editing a chart.

2.3.1 Adobe Illustrator

Adobe Illustrator is a commercial illustration tool with a subscription-based model, shown in Figure 2.6. It allows users to import vector graphics and apply effects such as Roughen, custom artistic brushes, or custom fonts to simulate sketch-like appearances. It provides detailed control over strokes, paths, and design elements, making it suitable for professional-level customisation. It also supports export in formats such as SVG, PNG, and PDF.

2.3.2 Inkscape

Inkscape, in contrast, is a free and open-source alternative to Adobe Illustrator, which supports similar functionality. It is shown in Figure 2.7. Inkscape allows users to apply path effects such as jitter and roughening, as well as filters to transform standard graphics into sketch-like representations. It also

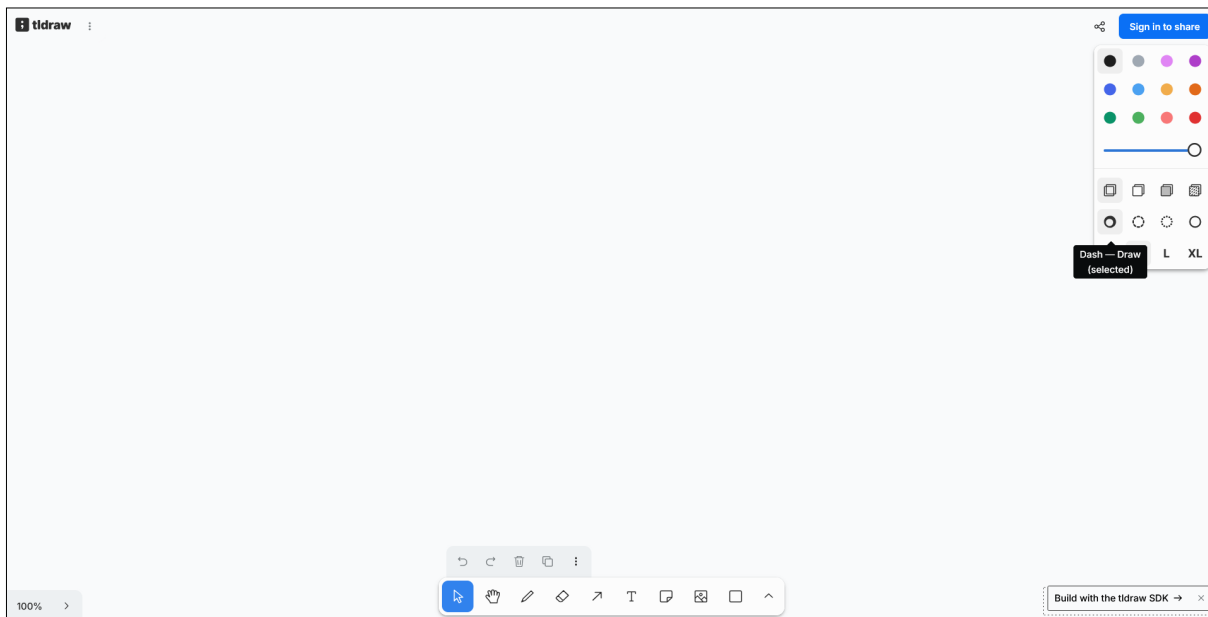


Figure 2.5: tldraw: User interface. [Screenshot taken from tldraw by the authors.]

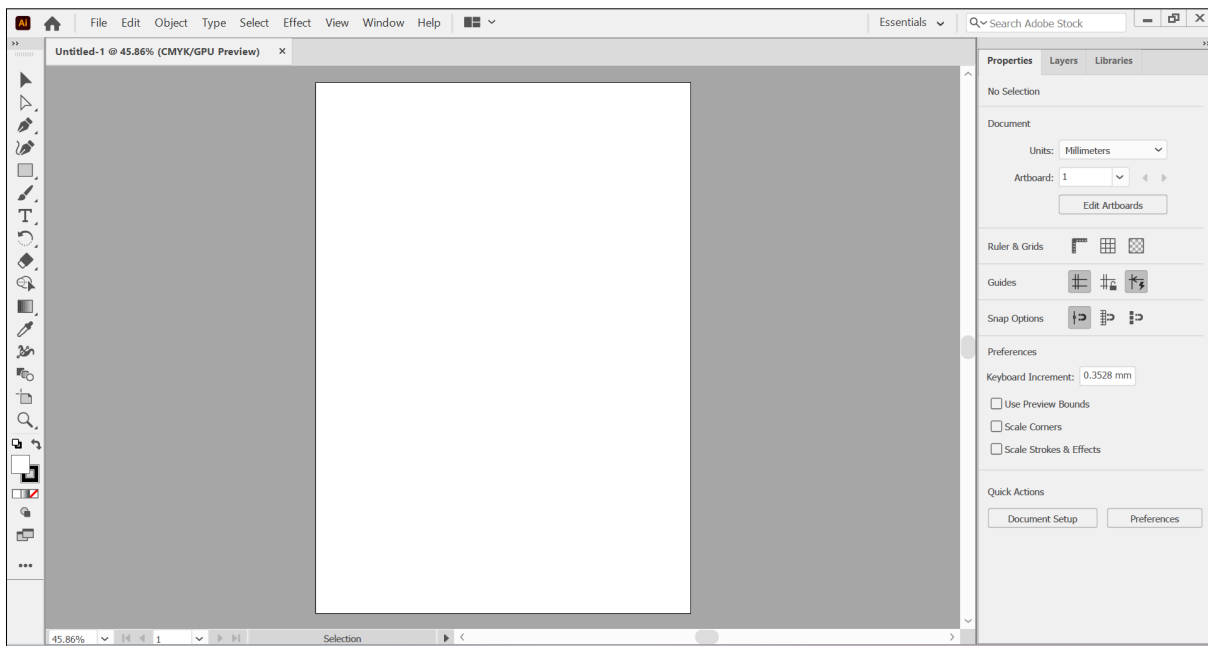


Figure 2.6: Adobe Illustrator: User interface. [Screenshot of Adobe Illustrator desktop app taken by the authors.]

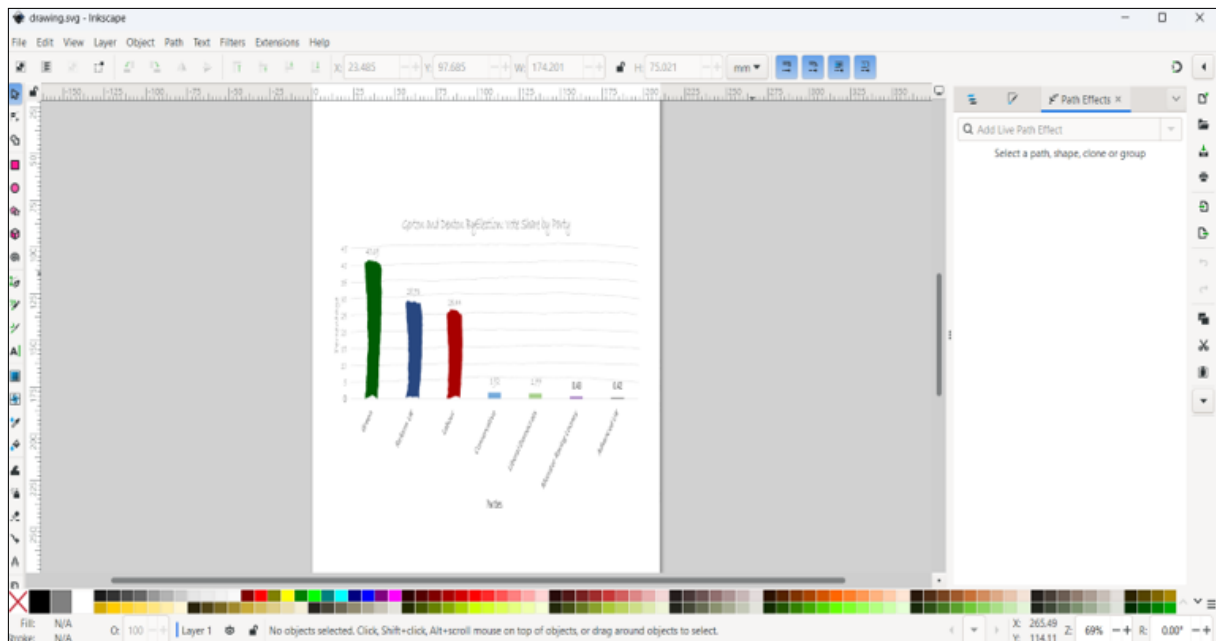


Figure 2.7: Inkscape: User interface. [Screenshot of Inkscape desktop app taken by the authors.]

supports export in formats such as SVG, PNG, and PDF, enabling integration into broader visualisation processes.

2.4 Programming Libraries

Programming libraries enable the creation of hand-drawn style visualisations through programming and are primarily geared toward developers.

2.4.1 Rough.js

Rough.js is a low-level JavaScript library that provides basic drawing primitives, allowing developers to create custom visualisations with hand-drawn aesthetics. However, it does not provide higher-level charting components, so users must implement their own logic for data binding and chart construction. It provides simple APIs for applying rough effects to shapes. An example is shown in Listing 2.1 and Figure 2.8.

2.4.2 roughViz

roughViz integrates Rough.js with D3 to provide higher-level chart components, such as bar charts and line charts. It supports CSV-based data input, interactive features such as tooltips, and configurable roughness levels, making it suitable for rapid development of sketch-style visualisations. An example is shown in Listing 2.2 and Figure 2.9.

2.5 Office Applications

In addition to specialised tools, some general-purpose office applications like spreadsheets and presentation tools also support the creation of hand-drawn looking charts. In particular, Excel and PowerPoint do so. Their features in terms of producing hand-drawn looking charts are compared in Table 2.4.

```

1 const bars = [
2   { y: 100, w: 813.8, c: '#2E8B57',
3     label: "Green", pct: "40.69%", textX: 1020 },
4   { y: 210, w: 574.6, c: '#12B6CF',
5     label: "Reform UK", pct: "28.73%", textX: 780.8 },
6   { y: 320, w: 508.8, c: '#E4003B',
7     label: "Labour", pct: "25.44%", textX: 714 },
8   { y: 430, w: 38.4, c: '#0087DC',
9     label: "Conservative", pct: "1.92%", textX: 244 },
10  { y: 540, w: 35.4, c: '#FAA61A',
11    label: "Liberal Democrats", pct: "1.77%", textX: 241 },
12  { y: 650, w: 8.6, c: '#FF00FF',
13    label: "Monster Raving Looney", pct: "0.43%", textX: 214 },
14  { y: 760, w: 8.4, c: '#555555',
15    label: "Advance UK", pct: "0.42%", textX: 214 }
16 ];
17
18 bars.forEach(b => {
19   svg.appendChild(rc.rectangle(200 + offX, b.y + offY, b.w, 100, {
20     fill: b.c,
21     fillStyle: 'hachure',
22     hachureAngle: 60,
23     hachureGap: 5,
24     roughness: 1.2
25   }));

```

Listing 2.1: Rough.js: Example code snippet to apply a rough effect.

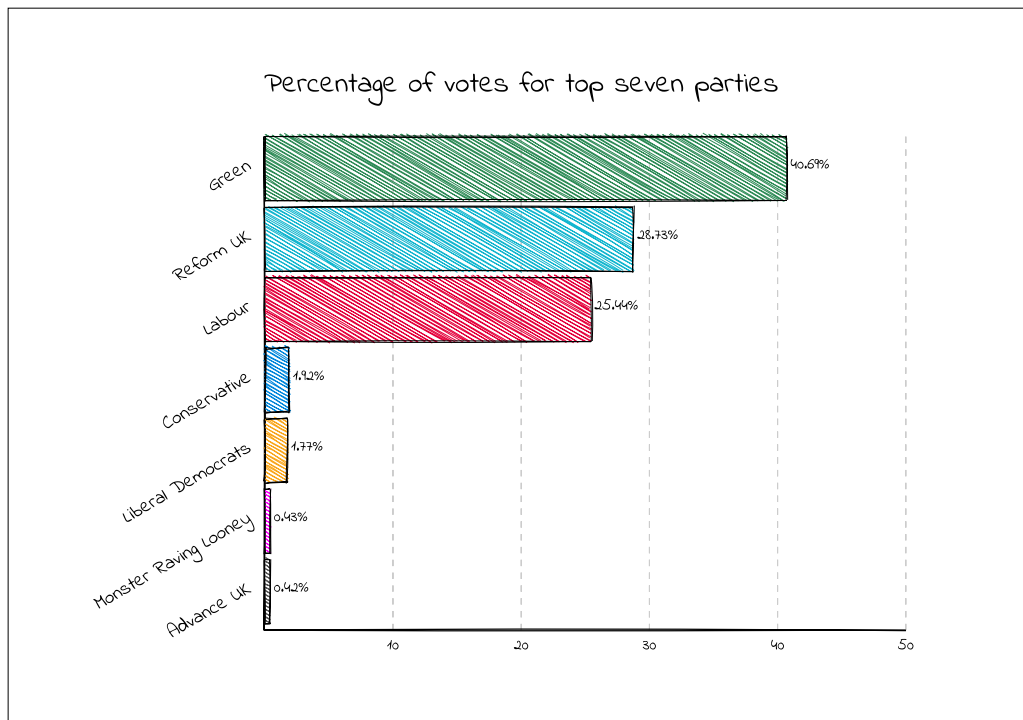


Figure 2.8: Rough.js: Bar chart of the UK Gorton and Denton by-election results from 26 Feb 2026. Data from MCC [2026]. [Chart made with Rough.js by the authors.]

```

1  d3.csv(csvPath).then(data => {
2
3  const labels = data.map(d => d.Party);
4  const values = data.map(d => +d.Percentage);
5
6  new roughViz.Bar({
7    element: '#viz',
8    data: {
9      labels: labels,
10     values: values
11   },
12   title: 'Votes Received by Party',
13   width: 800,
14   height: 800,
15   roughness: 1.5,
16   colors: 'coral',
17   stroke: 'black',
18   strokeWidth: 1,
19   fillStyle: 'hachure',
20   xLabel: "Party",
21   yLabel: "Percentage",
22   margin: { top: 100, right: 30, bottom: 200, left: 100 }
23 });

```

Listing 2.2: roughViz: Example code snippet to create a bar chart with CSV data.

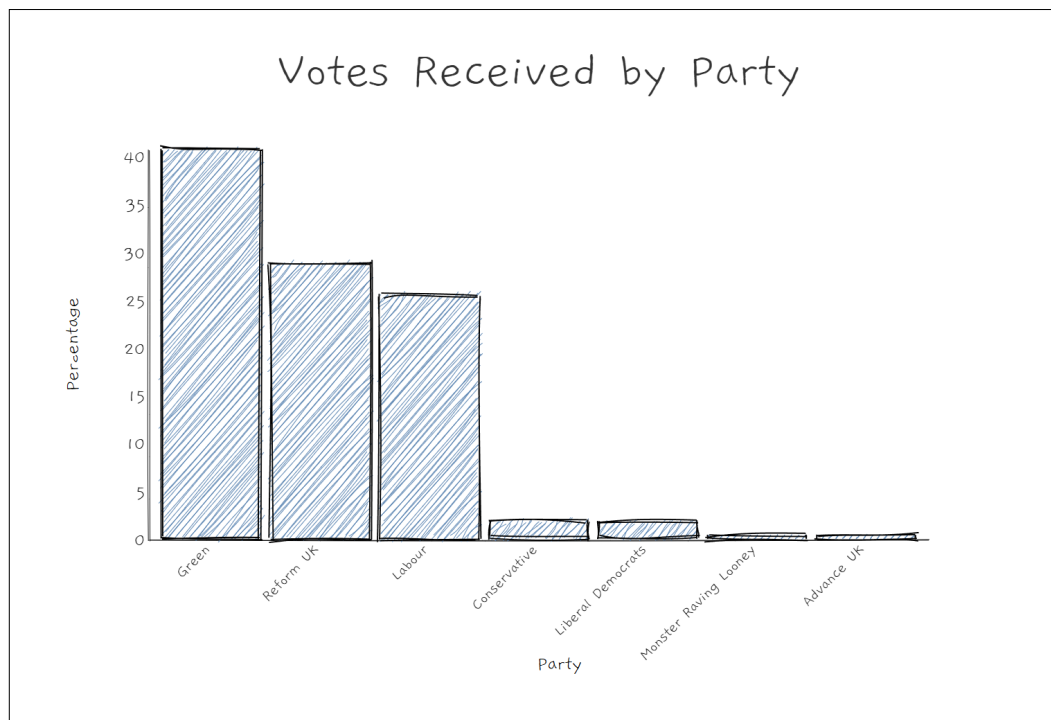


Figure 2.9: roughViz: Bar chart of the UK Gorton and Denton by-election results from 26 Feb 2026. Data from MCC [2026]. [Chart made with roughViz by the authors.]

	Excel	PowerPoint
Change Roughness:	✓	✓
Toggle Hand-Drawn Look:	✓	✓
Export SVG:	✓	✓
Import Data from Files:	✓	✓
Predefined Shapes:	✓	✓

Table 2.4: Comparison of office application features for hand-drawn looking charts.

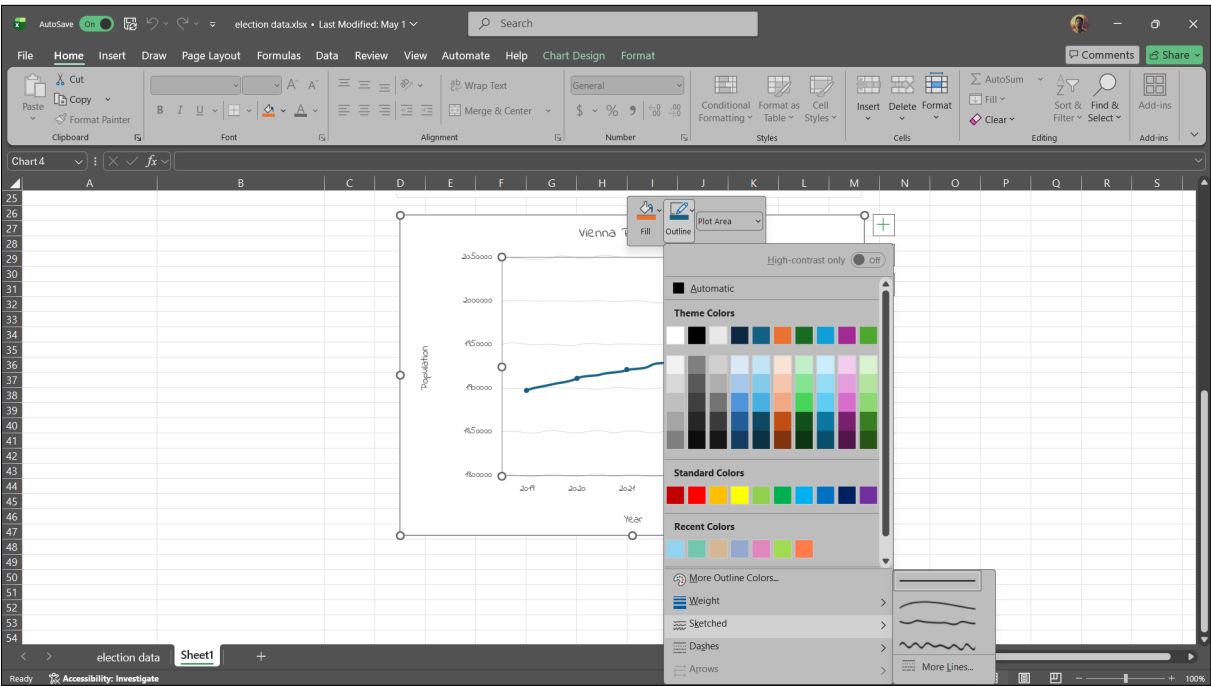


Figure 2.10: Excel: User interface with the Sketched option. [Screenshot taken from Excel by the authors.]

2.5.1 Excel

Excel allows users to generate charts directly from structured datasets using its built-in chart tools. To achieve a hand-drawn effect, users can apply the *Sketched* style option, which introduces a roughness parameter that alters the smoothness of lines and shapes, as shown in Figure 2.10. By adjusting this sketch setting, chart elements such as lines, borders, and outlines become more irregular and less precise, mimicking a hand-drawn appearance. This effect can be combined with additional formatting adjustments, such as line thickness, marker styles, and font choices to further enhance the informal look. Once styled, the chart can be exported in formats such as SVG, PNG, or JPEG.

2.5.2 PowerPoint

PowerPoint allows users to create charts from embedded data and apply visual styling effects that immitate a hand-drawn appearance. Users can apply the *Sketched* style option to introduce rough, irregular outlines, as shown in Figure 2.11. This effect can be combined with additional formatting adjustments, such as line thickness, marker styles, and font choices.

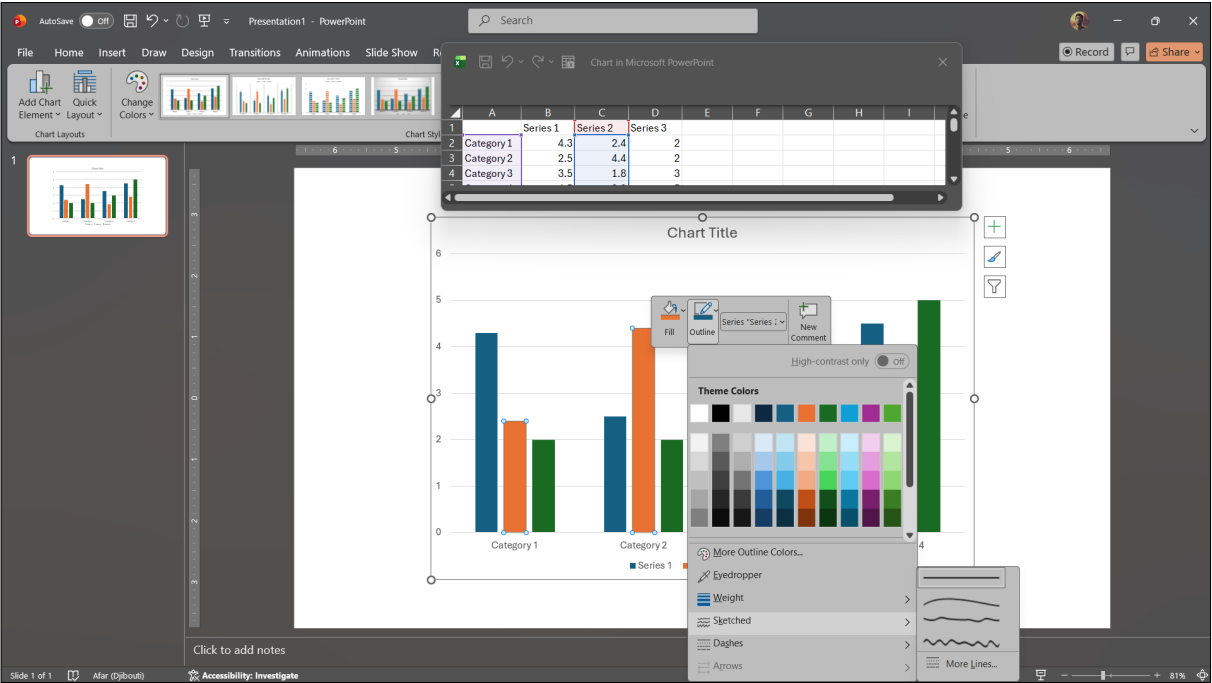


Figure 2.11: PowerPoint: User interface with the Sketched option. [Screenshot taken from PowerPoint by the authors.]

Chapter 3

Concluding Remarks

A range of tools are available for users to create hand-drawn looking charts suited to a variety of needs and contexts. Chartle and roughViz are recommended for quick, data-driven chart generation through direct CSV integration. Excalidraw is the recommended illustration tool for more expressive outputs, due to its built-in drawing features with a hand-drawn style. Inkscape is useful for cases requiring a high level of customisation through its advanced vector editing capabilities. Excel is suited for structured data handling, because of its efficient processing and visualisation of larger datasets.

Together, these tools provide flexibility in both design and functionality, allowing users to balance ease of use, visual style, and data complexity. This supports a wide range of applications, from rapid prototyping and exploratory analysis to more refined and communicative charts.

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