Novel Techniques in Private Telemetry Analysis

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Abstract

Your abstract goes here.

For your Quarter 1 Project, you won't link a website, but will link your code. For your Quarter 2 Proposal, you won't link either of these. For your actual Quarter 2 Project, you'll link both of these.

Website: https://endurable-gatsby-6d6.notion.site/DP-Telemetry-14556404e74780818747cbe76de2e04a?pvs=4[Notion until actual site is created]
Code: https://github.com/Trey-Scheid/Novel-Techniques-in-Private-Data-Analysis

1 Introduction

2 Methods

3 Results

4 Discussion

5 Conclusion

6 LaTeX Typesetting Examples

6.1 LaTeX Basics

- Here's a regular bulleted list item.
- And another.

Here's a hyperlink. If you want to use a numbered list, you can experiment with:

1. This.
2. This.
3. And this.

Here's how you might include a snippet of actual code:

```
# If you want to use syntax highlighting, look into the minted package.
def f(x):
    return 2 * x + 3
```

Here's how you might format a single equation:

$$\int_{-\infty}^{\infty} f_X(x) dx = 1$$

And a chain of equations:

$$
\begin{aligned}
\frac{1}{n}\sum_{i=1}^{n}(x_i-\bar{x})^2 &= \frac{1}{n}\sum_{i=1}^{n}(x_i^2-2x_i\bar{x}+\bar{x}^2) \\
&= \frac{1}{n}\sum_{i=1}^{n}x_i^2-\frac{2}{n}\bar{x}\sum_{i=1}^{n}x_i+\frac{\bar{x}^2}{n}\sum_{i=1}^{n}1 \\
&= \frac{1}{n}\sum_{i=1}^{n}x_i^2-2\bar{x}^2+\bar{x}^2 \\
&= \frac{1}{n}\sum_{i=1}^{n}x_i^2-\bar{x}^2
\end{aligned}
$$

6.2 Figure Examples

Here are some example figures. Figure 1 presents a scatter plot.

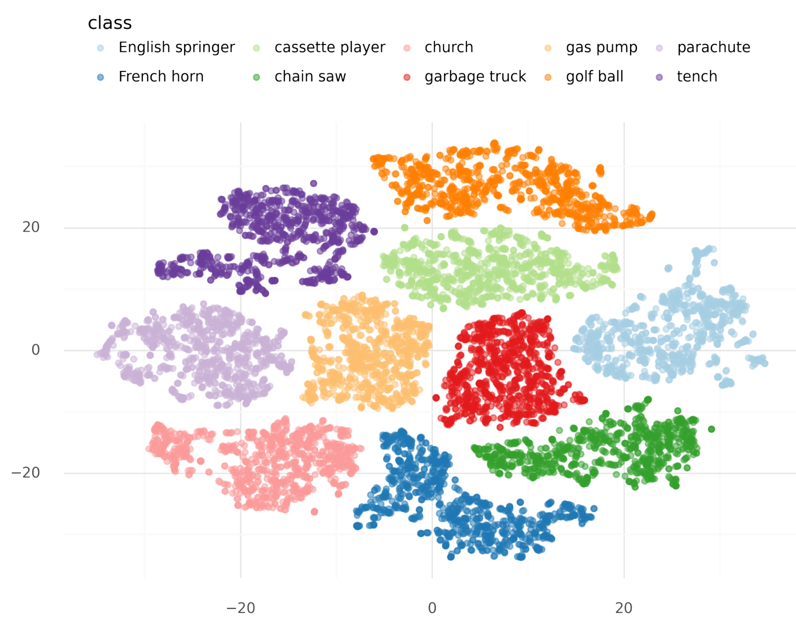

Figure 1: Yes, put a few words or sentences here explaining what is in the figure.

Figure 2 presents some summaries of the performance of our model. The left panel of Figure 2 presents something. The right panel of Figure 2 presents some other things.

6.3 Table Examples

Table 1 presents some summary of the data.

Table 2 presents some summaries of the performance of our model.

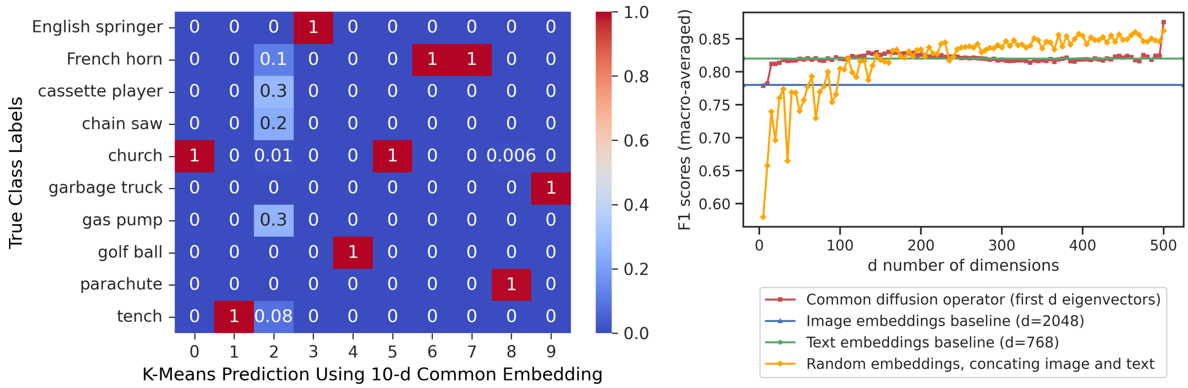

Figure 2: You can put figures side-by-side as well.

Table 1: Some Table Caption

Part		
Name	Description	Size (μm)
Dendrite	Input terminal	$\sim$100
Axon	Output terminal	$\sim$10
Soma	Cell body	up to 10^6

Table 2: Some Other Table Caption

Method	Modality	Edit distance	BLEU	METEOR	Precision	Recall	F1
PDF	All	0.255	65.8	82.1	77.1	81.4	79.2
GROBID	All	0.312	55.6	71.9	74.0	72.1	73.0
+ LaTeX OCR	Tables	0.626	25.1	64.5	61.4	80.7	69.7
	Plain text	0.363	57.4	69.2	82.1	70.5	75.9
	Math	0.727	0.3	5.0	11.0	8.6	9.7
Nougat base (350M*)	All	**0.071**	**89.1**	**93.0**	93.5	**92.8**	**93.1**
	Tables	0.211	69.7	79.1	75.4	80.7	78.0
	Plain text	0.058	91.2	94.6	96.2	95.3	95.7
	Math	0.128	56.9	75.4	76.5	76.6	76.5

6.4 Equations and Algorithms Examples

Algorithm 1 implements Fuzzy K-means.

Algorithm 1: Fuzzy K-means clustering algorithm

1. Choose primary centroids v_k
2. Compute the membership degree of all feature vectors in all clusters

$$u_{ki} = \frac{1}{\sum_{j=1}^{K} \left(\frac{D^2(x_i - v_k)}{D^2(x_i - v_j)}\right)^{\frac{2}{m-1}}} \tag{1}$$

Algorithm 2 calculates net activation.

Algorithm 2: Computing Net Activation

Input: $x_1, \ldots, x_n, w_1, \ldots, w_n$
Output: y, the net activation
$y \leftarrow 0$;
for $i \leftarrow 1$ **to** n **do**
    $y \leftarrow y + w_i * x_i$;

In Variational Autoencoder (VAE), we directly maximize the Evidence Lower Bound (ELBO) using the following Equations 2–4.

$$\begin{aligned}
\mathbb{E}_{q_\phi(z|x)}\left[\log \frac{p(\boldsymbol{x},\boldsymbol{z})}{q_\phi(\boldsymbol{z} \mid \boldsymbol{x})}\right] &= \mathbb{E}_{q_\phi(z|x)}\left[\log \frac{p_\theta(\boldsymbol{x} \mid \boldsymbol{z})p(\boldsymbol{z})}{q_\phi(\boldsymbol{z} \mid \boldsymbol{x})}\right] && (2)\\
&= \mathbb{E}_{q_\phi(z|x)}[\log p_\theta(\boldsymbol{x} \mid \boldsymbol{z})] + \mathbb{E}_{q_\phi(z|x)}\left[\log \frac{p(\boldsymbol{z})}{q_\phi(\boldsymbol{z} \mid \boldsymbol{x})}\right] && (3)\\
&= \underbrace{\mathbb{E}_{q_\phi(z|x)}[\log p_\theta(\boldsymbol{x} \mid \boldsymbol{z})]}_{\text{reconstruction term}} - \underbrace{\mathcal{D}_{\mathrm{KL}}(q_\phi(\boldsymbol{z} \mid \boldsymbol{x}) \,||\, p(\boldsymbol{z}))}_{\text{prior matching term}} && (4)
\end{aligned}$$

6.5 Inline Citation Examples

Citation in text (no parentheses): use `\cite{citekey}`. For example, **?**, **?**.

Citation in parentheses: use `\citep{citekey}`. For example: (**?**), (**?**).

Appendices

A.1 Training Details

A.2 Additional Figures

A.3 Additional Tables