Cartesian closed categories and the price of eggs

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Hello world!

We present breakdown time data for various research activities in Table 1.

Table 1: Example of breakdown of time spent.

Task	Time Spent (minutes)	Time We Wish We Spent (minutes)
Fiddling with equations	120	5
Correcting reference order	60	0
Looking for “that one” reference	90	1
Copy-pasting figures	20	0
Rerunning all data	180	20
Fixing reference meta-data	60	0
Actually doing research	900	1500

An example of an equation is Fick’s second law (Eq. (1)).

$$\frac{\partial\varphi}{\partial t} = D\frac{\partial^2\varphi}{\partial x^2} \tag{1}$$

Once we’ve defined abbreviations in `abbrev.tex`, we can call those abbreviations using the `gls` command. In the case of “machine learning”, the first usage of `gls` will give the full form as in machine learning (ML). The next usage of `gls` will give the abbreviated version as in ML.

After we’ve included the bibliography file in the `bibliography` command, we can start citing articles using the `natbib` `cite` and `citet` commands, as in the following example:

Wang et al. [1] emphasized the need for reproducible methods and benchmarking. Another work further emphasized the importance of these topics [2].

Typesetting equations in Mathematica can be very effective. Here is an example of a teaching figure:

$$\overbrace{\begin{pmatrix}\text{Distances}\\ \text{Angles}\\ \text{Area}\\ \text{Volume}\end{pmatrix}}^{\text{Features}} \overbrace{\begin{pmatrix}0.1\text{Å}\\ 0\text{rad}\\ 0\text{Å}^2\\ 0\text{Å}^3\end{pmatrix}}^{\text{Lower Bound}} \overbrace{\begin{pmatrix} 0 & 0.1 & 0.3 & 0.1 & 0 & 0 & 0.2 & 0.4 & 0.2 & 0 & 0 & \dots & 0\\ 0 & 0.1 & 0.2 & 0.4 & 0.2 & 0.1 & 0 & 0 & 0 & 0 & 0 & \dots & 0.2\\ 0 & 0 & 0 & 0.3 & 0.6 & 0.3 & 0 & 0 & 0 & 0.1 & 0.2 & \dots & 0\\ 0 & 0 & 0 & 0 & 0 & 0.4 & 0.6 & 0.4 & 0 & 0 & 0 & \dots & 0.1 \end{pmatrix}}^{\text{Gaussian Encoding}} \overbrace{\begin{pmatrix}15\text{Å}\\ \pi\text{rad}\\ 225\text{Å}^2\\ 3375\text{Å}^3\end{pmatrix}}^{\text{Upper Bound}} \tag{2}$$

Figures and captions can be generated programmatically. See for example.

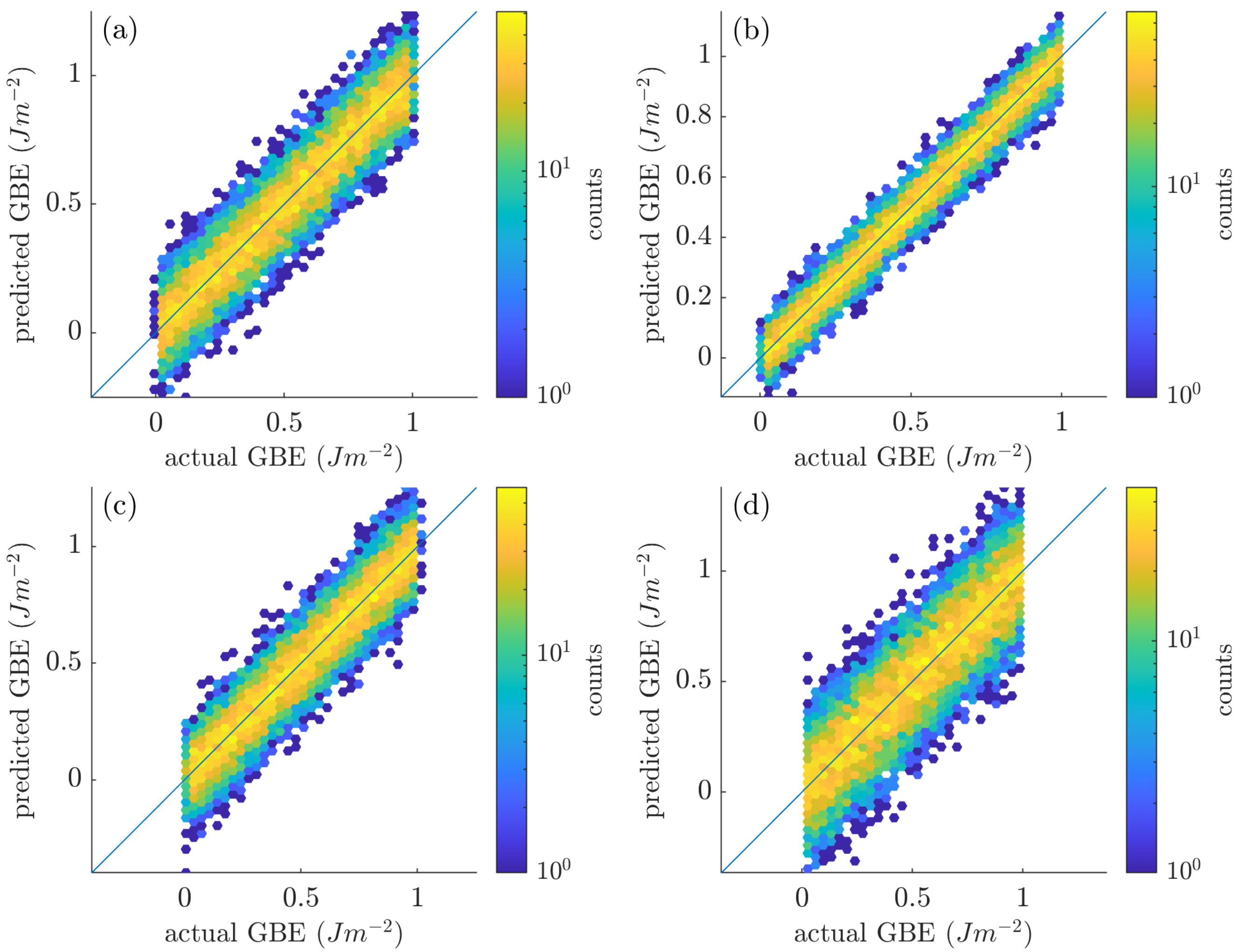

Figure 1: Parity plots with root mean square errors (RMSEs) of (a) 0.098456, (b) 0.050737, (c) 0.099079, and (d) 0.14963 $\mathrm{J\,m^{-2}}$.

$$\frac{dy}{dx} = \lim_{h \to 0} \frac{f(h+x) - f(x)}{h} \tag{3}$$

Acronyms

ML machine learning 1

RMSE root mean square error 2

References

[1] A. Y.-T. Wang, R. J. Murdock, S. K. Kauwe, A. O. Oliynyk, A. Gurlo, J. Brgoch, K. A. Persson, T. D. Sparks, Machine Learning for Materials Scientists: An Introductory Guide toward Best Practices, Chemistry of Materials 32 (2020) 4954–4965. doi:10.1021/acs.chemmater.0c01907.

[2] A. S. Barnard, Best Practice Leads to the Best Materials Informatics, Matter 3 (2020) 22–23. doi:10.1016/j.matt.2020.06.003.