# Stream Mining

## One-Hot Encoding and DGIM

Zeno Adrian Weil

Data Science 1
Goethe University Frankfurt

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# One-Hot Encoding

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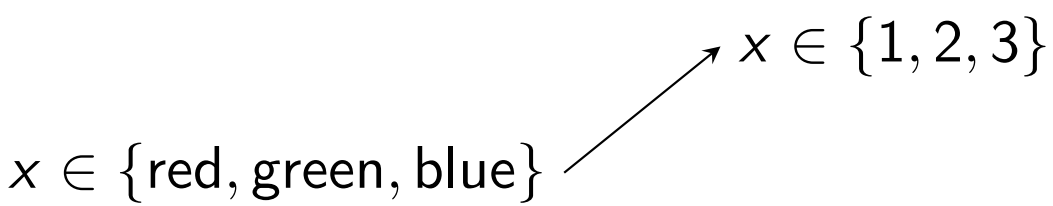

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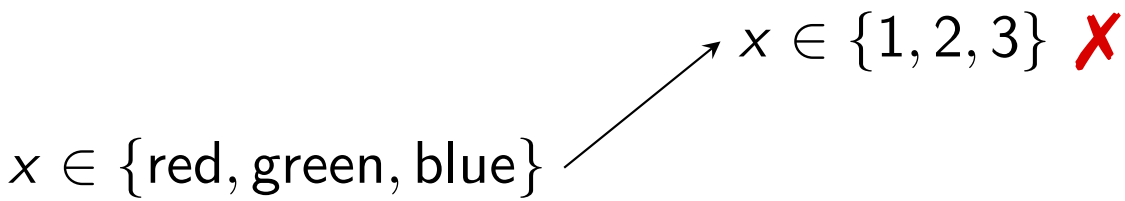

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- naïve approach: number serially
  - meaningless numerical calculations
- **one-hot encoding**
  - one binary feature for each possible value

$$x \in \{\text{red}, \text{green}, \text{blue}\} \rightarrow x \in \{1, 2, 3\}$$ ✗

$$x \in \{\text{red}, \text{green}, \text{blue}\} \rightarrow (x_{\text{red}}, x_{\text{green}}, x_{\text{blue}}) \in \{0, 1\}^3$$ ✓

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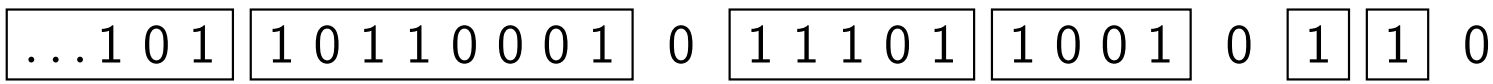

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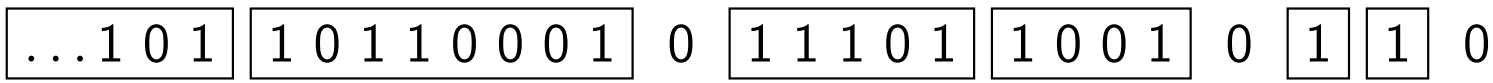

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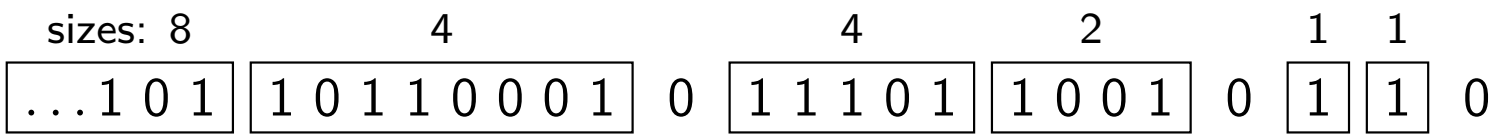

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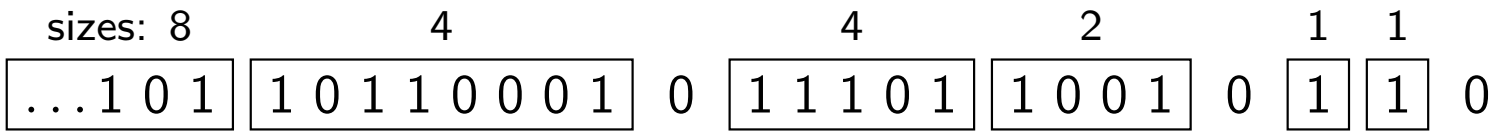

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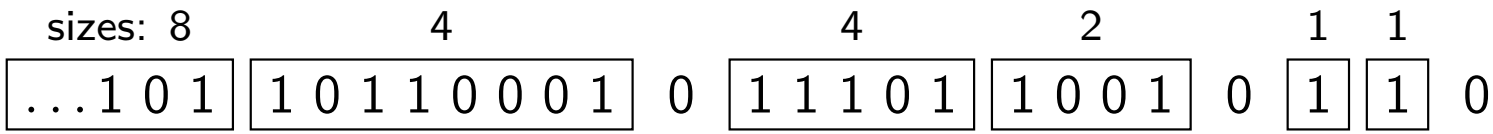

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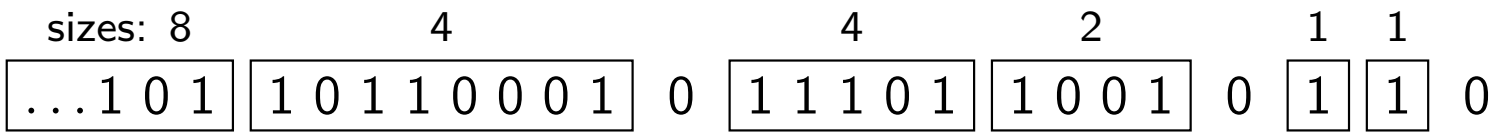

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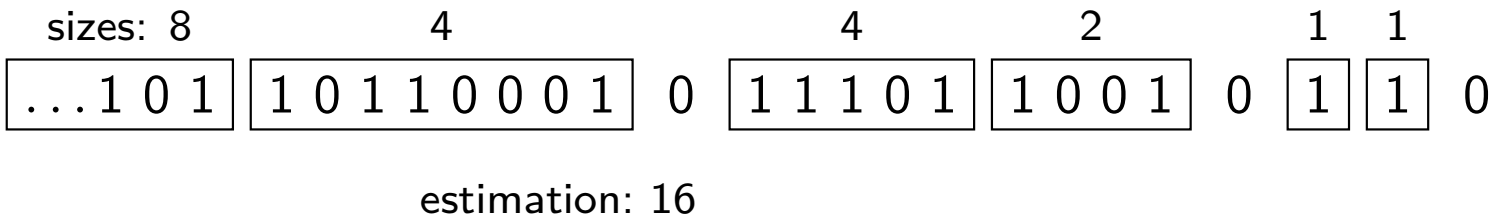

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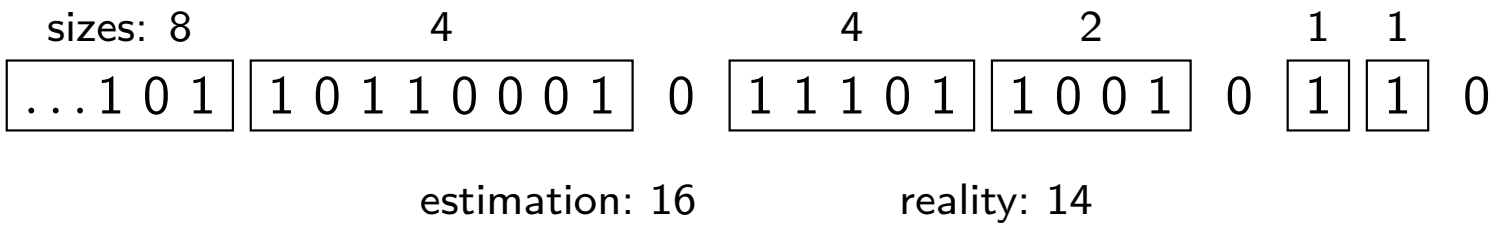

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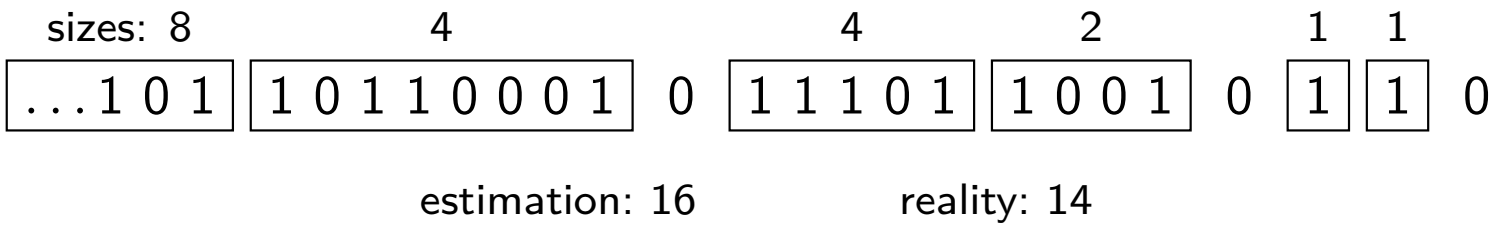

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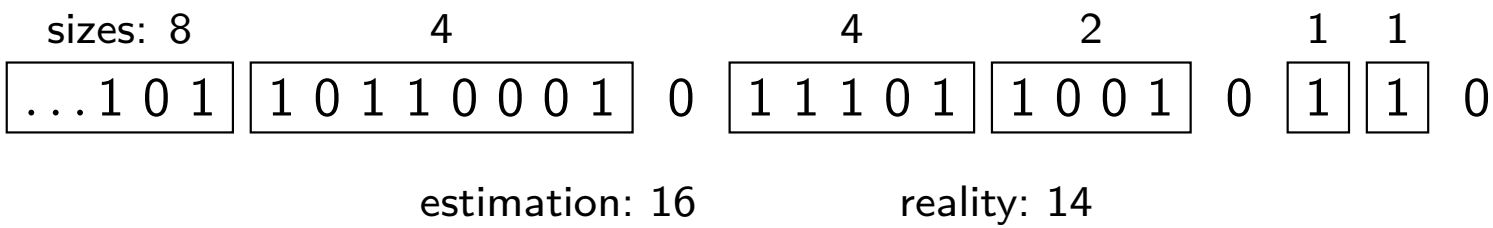
- needs only $\mathcal{O}((\log_2 N)^2)$ **bits**



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p,x,s,n,t,p,f,c,n,k,e,e,s,s,w,w,p,w,o,p,k,s,u
e,x,s,y,t,a,f,c,b,k,e,c,s,s,w,w,p,w,o,p,n,n,g
e,b,s,w,t,l,f,c,b,n,e,c,s,s,w,w,p,w,o,p,n,n,m
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Are there simple rules to determine edibility? **Yes!** (e.g. odour)

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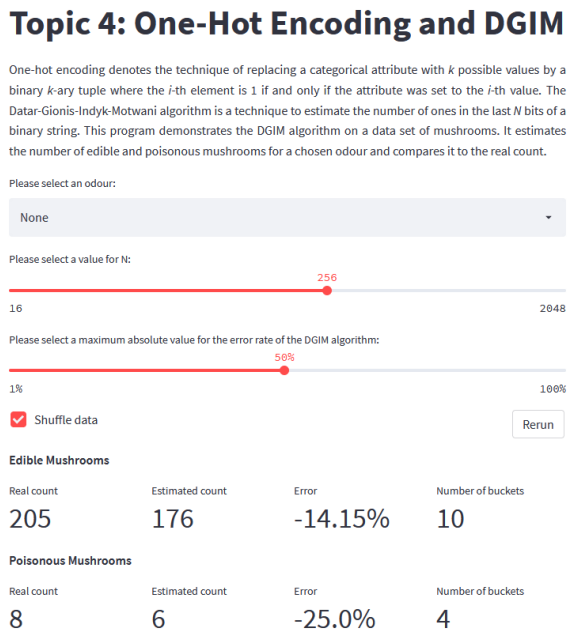

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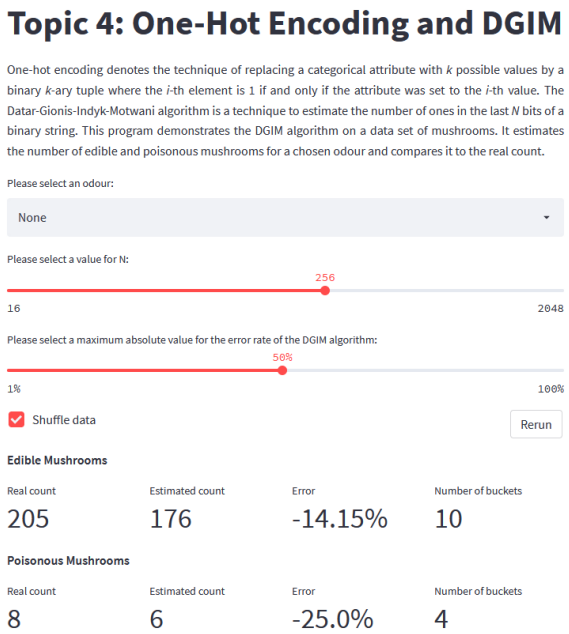

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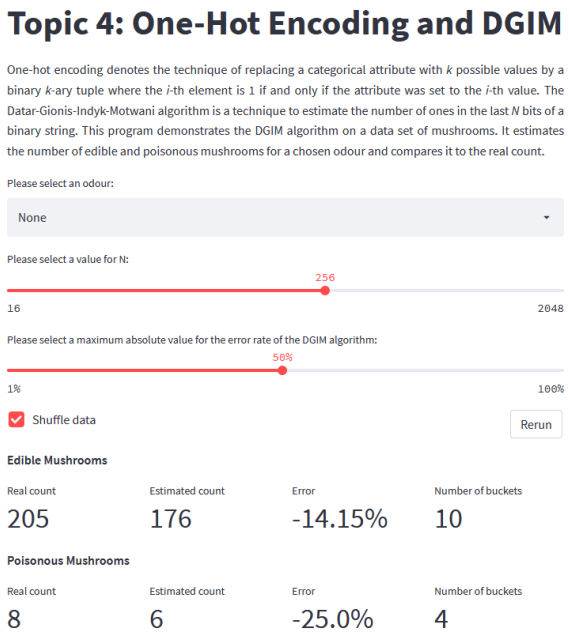

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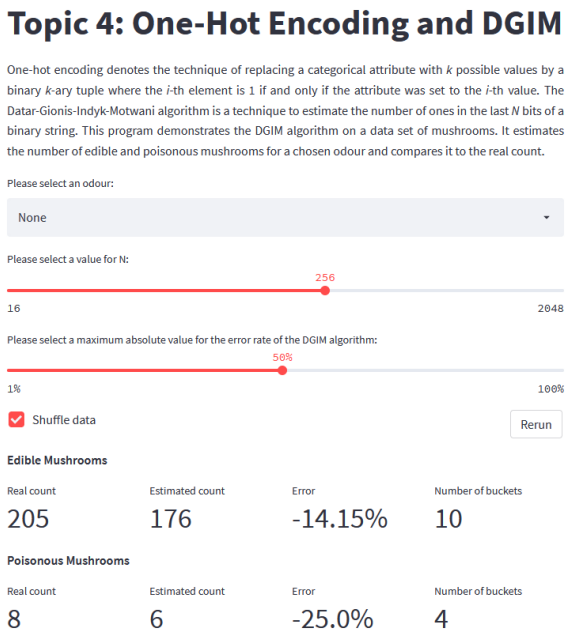

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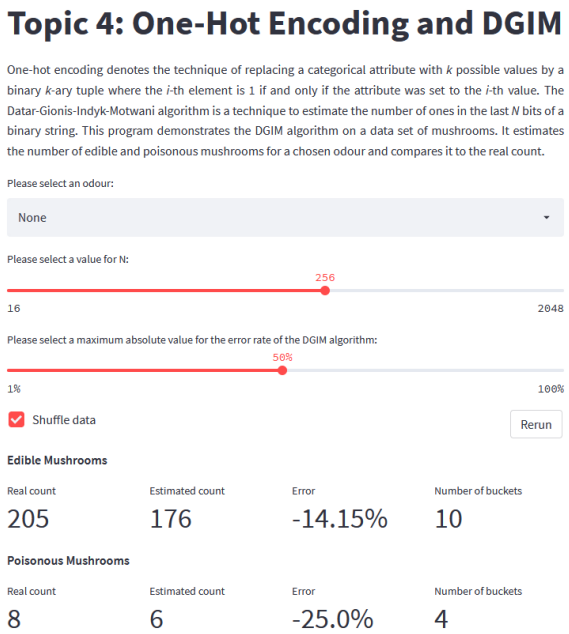
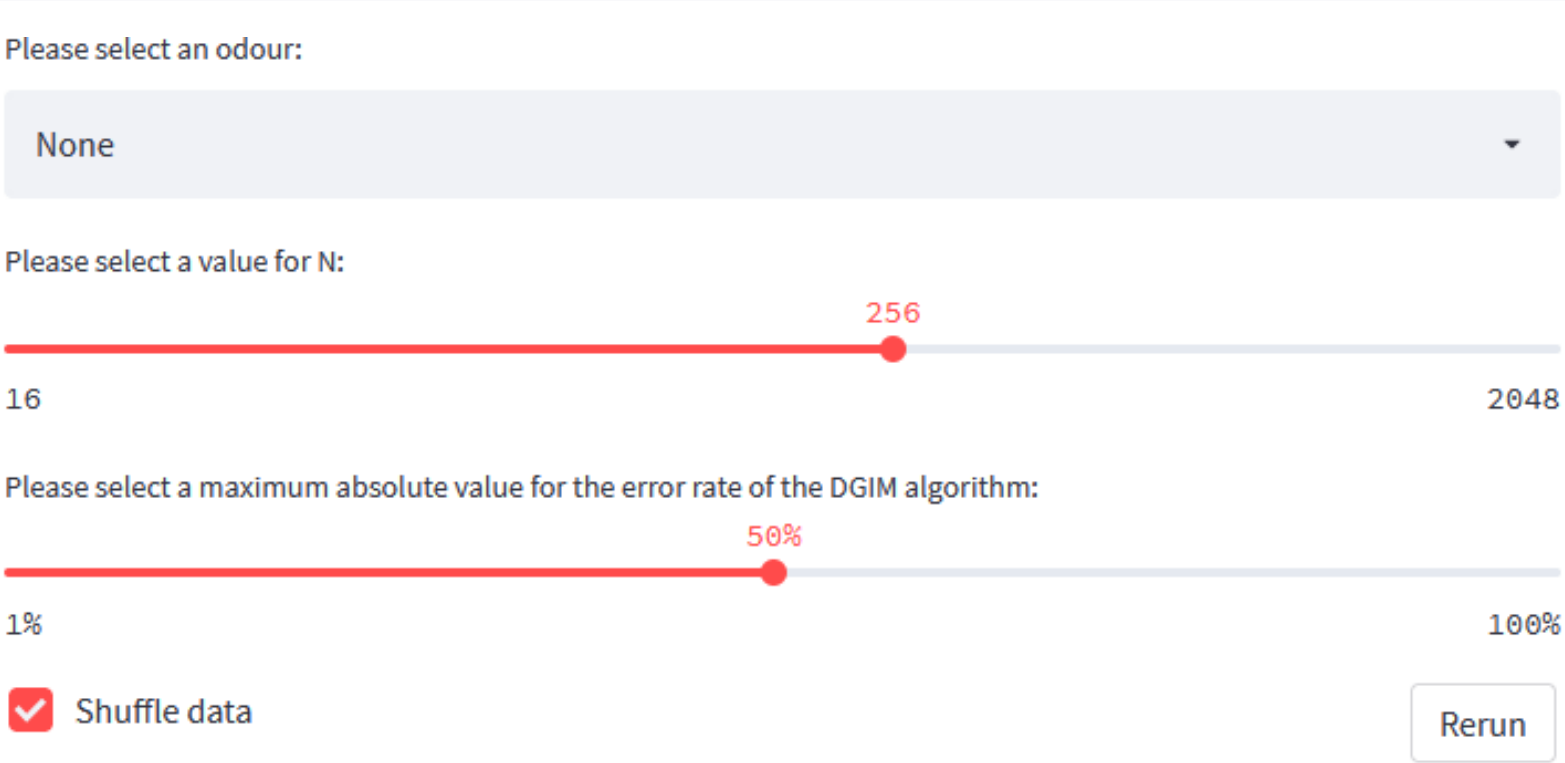
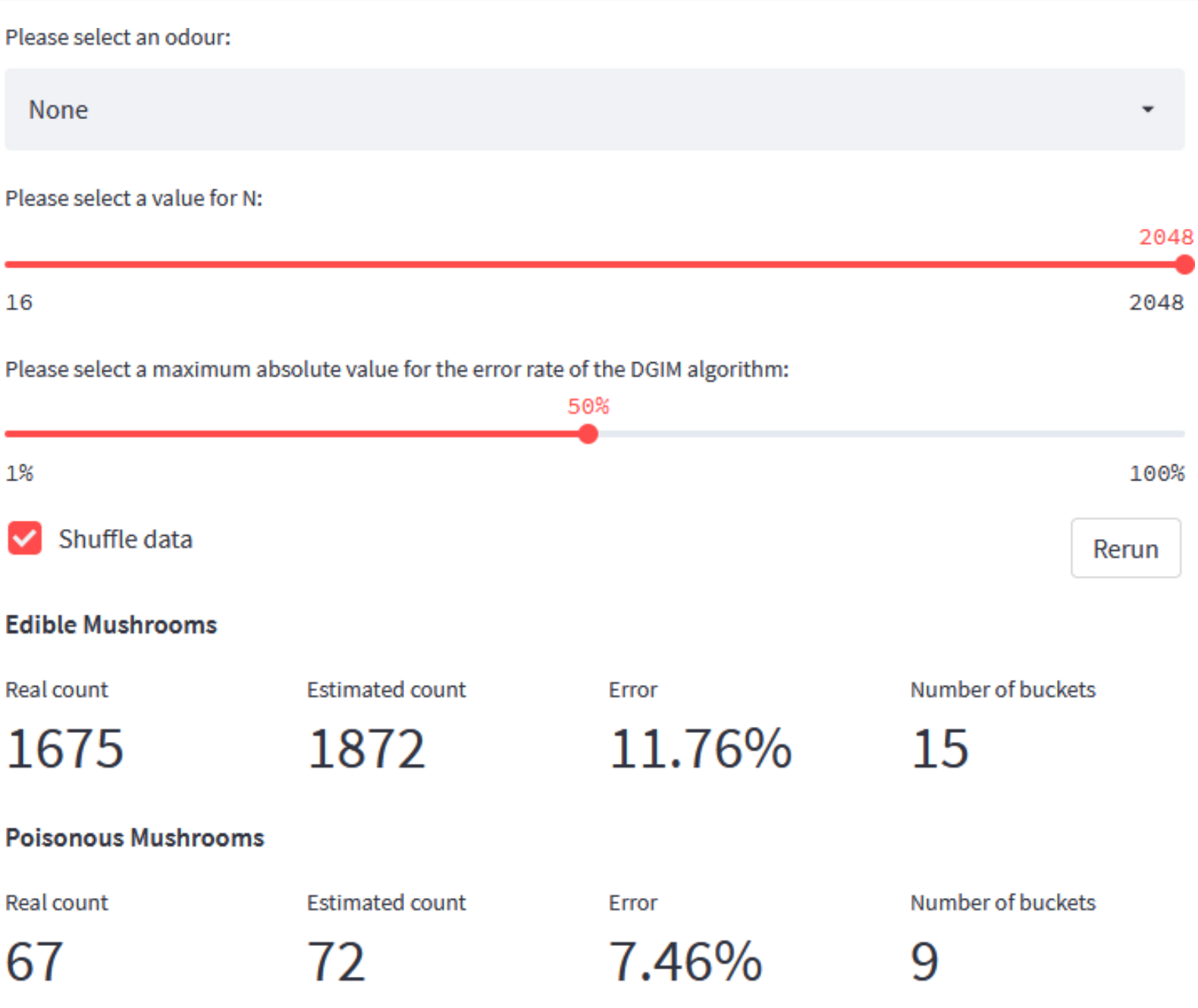



Please select an odour:
None
Please select a value for N:
256
16
2048
Please select a maximum absolute value for the error rate of the DGIM algorithm:
50%
1%
100%
Shuffle data
Rerun
Edible Mushrooms
Real count
214
Estimated count
208
Error
-2.8%
Number of buckets
10
Poisonous Mushrooms
Real count
11
Estimated count
12
Error
9.09%
Number of buckets
6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Shuffle data
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1675
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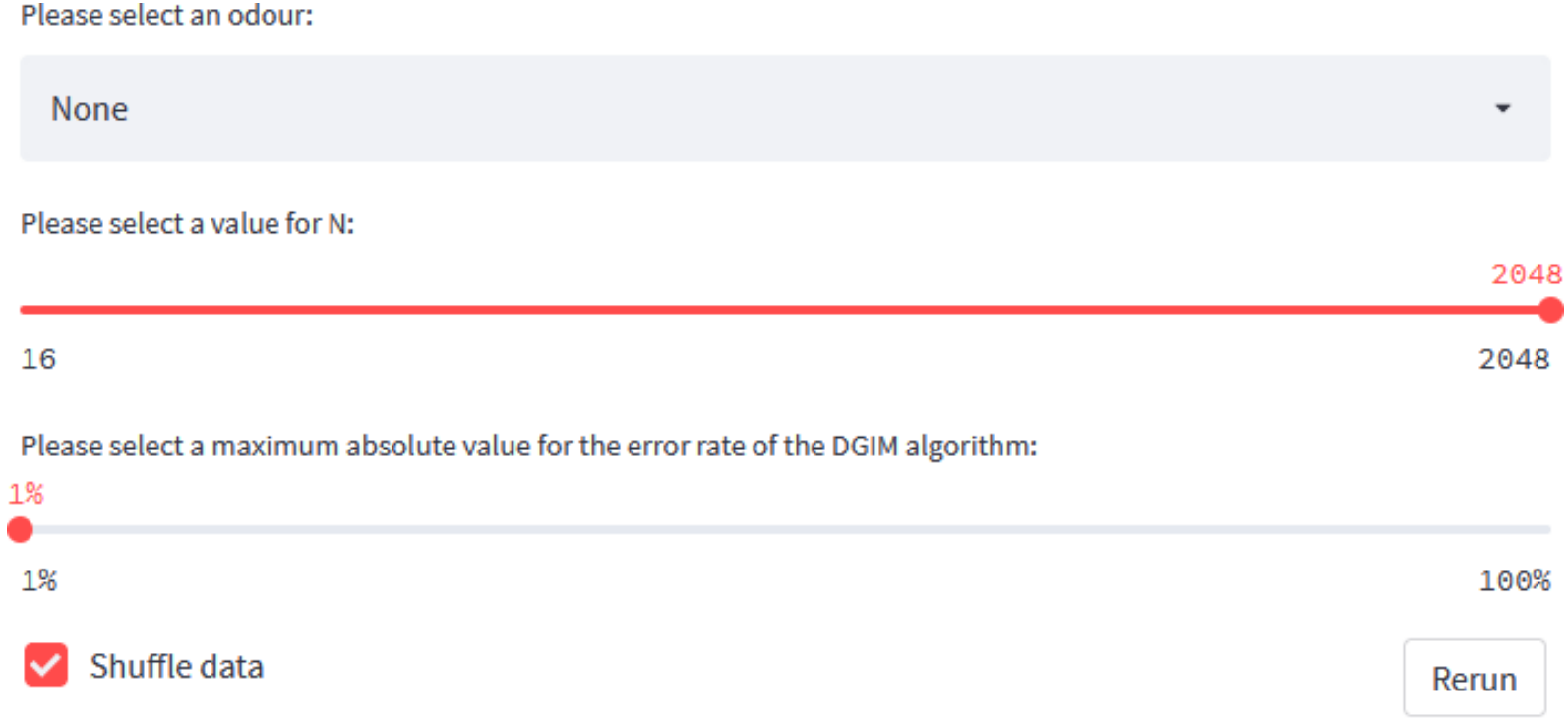
1872
Error
11.76%
Number of buckets
15
Poisonous Mushrooms
Real count
67
Estimated count
72
Error
7.46%
Number of buckets
9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Error
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Number of buckets
410
Poisonous Mushrooms
Real count
68
Estimated count
68
Error
0.0%
Number of buckets
68

# References


- Project code: `https://github.com/s9770652/DS1-DGIM`
- Mushroom data set: `https://archive-beta.ics.uci.edu/ml/datasets/mushroom`
- *Streamlit*: `https://streamlit.io/`
- Python package *dgim*: `https://pypi.org/project/dgim/`
- Description of one-hot encoding: `https://sherbold.github.io/intro-to-data-science/04_Data-Analysis-Overview.html#Features`
- Description of the DGIM algorithm (Section 4.6): `http://infolab.stanford.edu/~ullman/mmds/ch4.pdf`