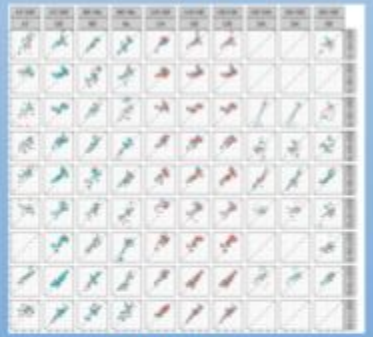
STOP VISUALIZING DATA

- NUMBERS ARE NOT IMAGES
- YEARS OF PLOTTING yet NO INSIGHT
- COLOR-BLIND palettes?? How about REALITY-BLIND!!

Look at what data scientists have been demanding your respect for all this time, with all the sns.displot and geom_errorbar we've built for them

(these are REAL plots, made by REAL data scientists)



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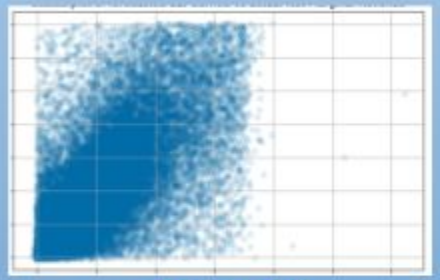

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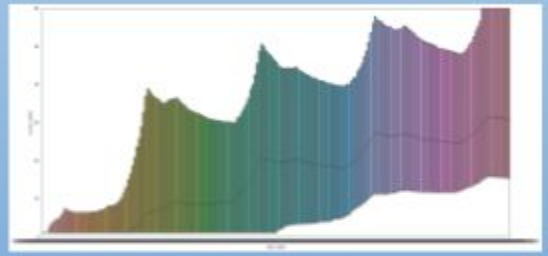

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They have played us for absolute fools

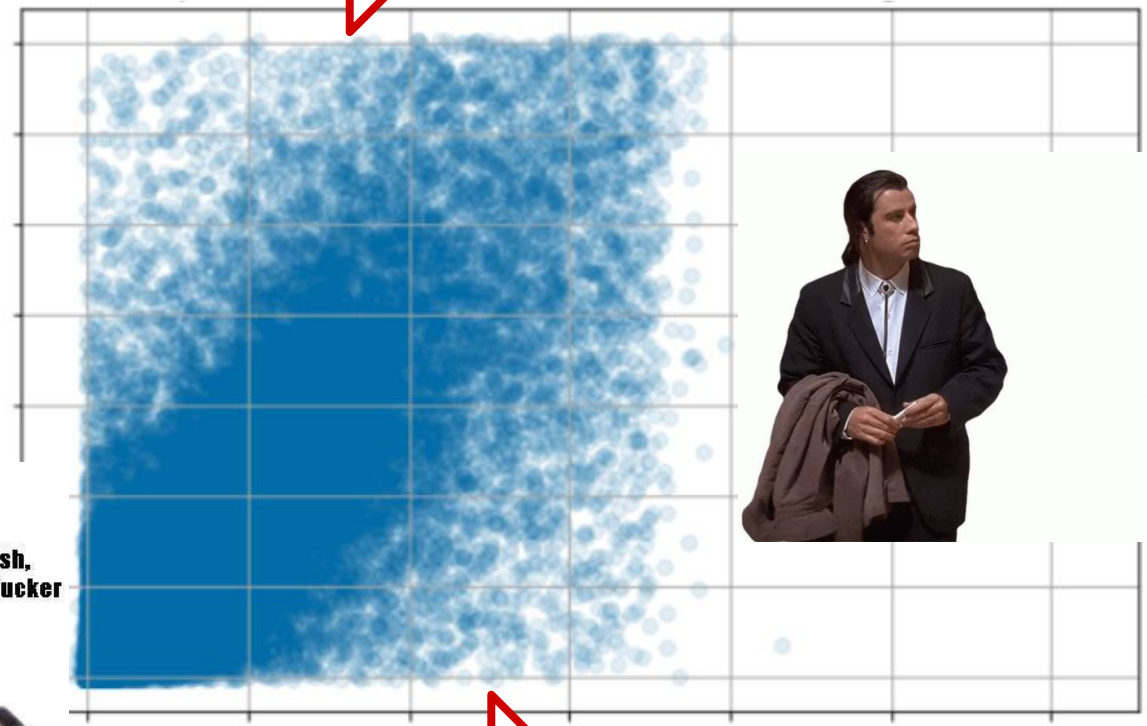
Tales of data science soft skills

Lars Roemheld, http://mdl.fit/
pyData Zurich, 25 Jan 2024

Where fashion meets tech and convenience.

Do as I say,
not as I do.

SO WHAT??



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Ownership

Our job is to solve ambiguous problems end-to-end.

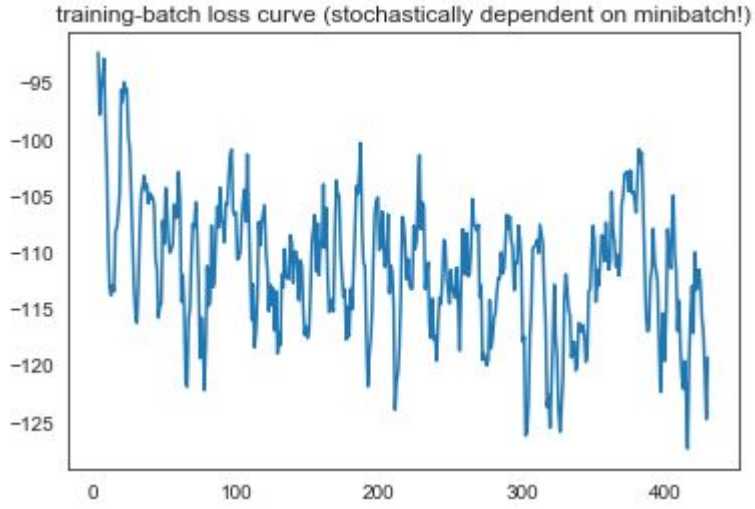
International Journal of Forecasting
Volume 36, Issue 3, July–September 2020, Pages 1181-1191

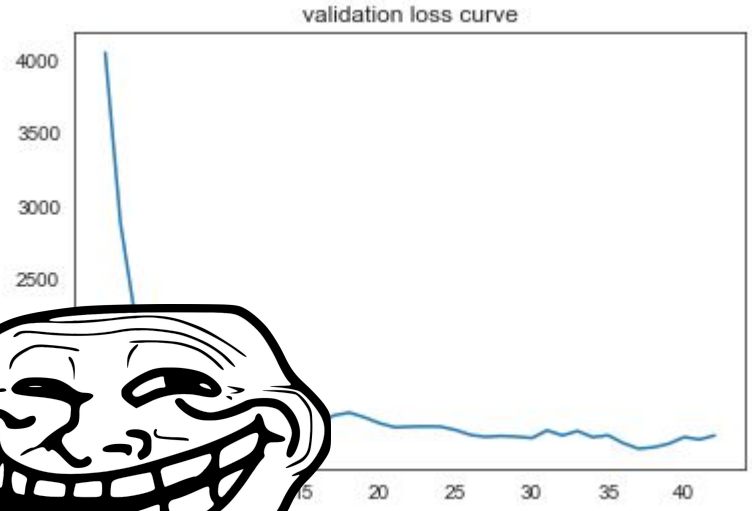
DeepAR: Probabilistic forecasting with autoregressive recurrent networks

David Salinas, Valentin Flunkert, Jan Gasthaus, Tim Januschowski

```
class DeepAR(nn.Module):
    def __init__(self, n_lstm_layers, n_lstm_hidden, lstm_direct
        '''
        Instantiates a DeepAR model.
        n_lstm_layers: number of LSTM cells stacked in sequence
        n_lstm_hidden: number of hidde units per LSTM cell (i.e
        lstm_direct_features: list of p as-colu
                              Note: these sh uld
                              of ~[-6, 6] due t
        lstm_categorical_features: dictionary of
        y_nonnegative: indicates if predicted val
        '''
        super(DeepAR, self).__init__()
        self.n_lstm_layers = n_lstm_layers
        self.n_lstm_hidden = n_lstm_hidden
        self.lstm_direct_features = lstm_direct_features
        self.lstm_categorical_features = lstm_categorical_featur
        self.y_nonnegative = y_nonnegative

        # build network
        self.cat_embeddings_total_dim = 0
        self.cat_embedding_layers = {} # TODO use nn.moduledict
        for c, embed_config in lstm_categorical_features.items()
            self.cat_embedding_layers[c] = nn.Embedding(embed_co
```





Cool loss bro. Xgboost yet?

Measure twice, cut once

In exploratory work, explicit planning prevents getting lost.

Demand forecast: hypothesis tree

Problem: forecast demand in e-commerce for pricing

1. Problem: seasonality, trend
    1.1. fbprophet/nixtla/…
    1.2. ARIMA from a package
    1.3. Exponential seasonal smoothing w/ xgboost/lgbm 🤦
    1.4. …
    1.5. …
    1.6. That cool SOTA paper I saw on xitter

Demand forecast: hypothesis tree

2. Problem: different scales of timeseries
    2.1. StandardScaler()
    2.2. Log scales
    2.3. Normalization w/ moving average
    2.4. …
    2.5. …
    2.6. That latest scale-invariant transformer architecture

Demand forecast: hypothesis tree

3. Problem: censored data on stockouts
    - 3.1. NULL value and no forecast
    - 3.2. …
    - 3.3. …
    - 3.4. Self-consistent hallucination-interpolation

Algorithm 1 Hypothesis Trees

Require: Clear problem statement X

Ensure: Envisioned solution solves original problem

```
while Problem X is unsolved do
    if X is purely empirical then
        Find solution to X in data
        return                                          ▷ Phew!
    end if
    C ← {breadth-first brainstormed approaches, incl. off-the-shelf}
    ∀c ∈ C : Ê(Validation-effort(c))
    C ← sorted(C)
    X ← C_0
end while
```

Complete tree of validation effort breadth-first search *before* first line of code!

Efficient curiosity

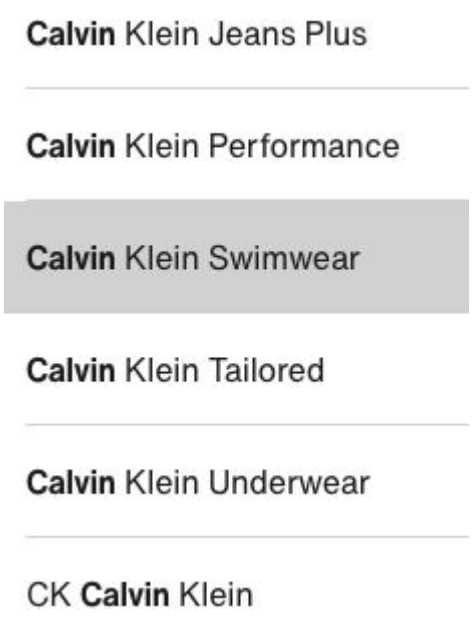
We like to learn. Ideally more efficiently than through brute-force experiments.

Build your scientific intuition

- Meta-reasoning and mentors: *why* did someone choose the approach they did?
- Fundamentals
  - Databases 101 (e.g., Harvard CS50)
  - Stats & learning theory (e.g., Taddy - Business Data Science)
- Curiosity and similar problems

Iterative results

Frequent feedback reduces ambiguity.



- Prefix/suffix
- ~~Deep NLP model~~
- Get senior mentorship for breadth-first search
- Levenshtein distance
- Find string tools library, experiment
- Max substring, min edit distance
- Get PR review, ship it!

mdl.fit