
Building Machine
Learning Powered
Applications

ML particularly useful to build systems for which we are unable to define a heuristic solution.

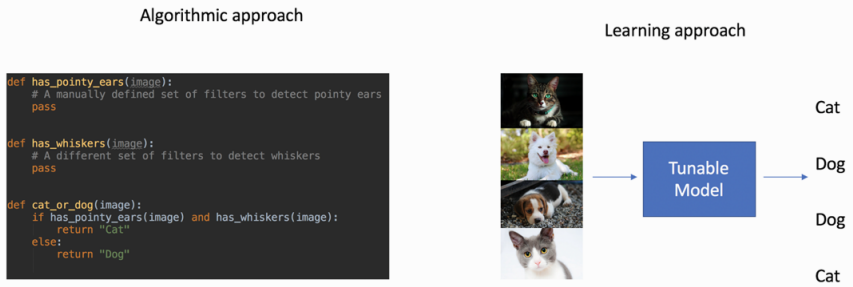


Figure 1-1. From defining procedures to showing examples

An application that calculates your taxes automatically should rely on guidelines provided by the government. As you may have heard, having errors on your tax return is generally frowned upon. This makes the use of ML for automatically generating tax returns a dubious proposition.

You never want to use ML when you can solve your problem with a manageable set of deterministic rules


When building products, you should start from a concrete business problem
I am your father.

More projects fail by producing good models that aren't helpful for a product rather than due to modeling difficulties

ML based Editor

Figure 1-10. End-to-end approach

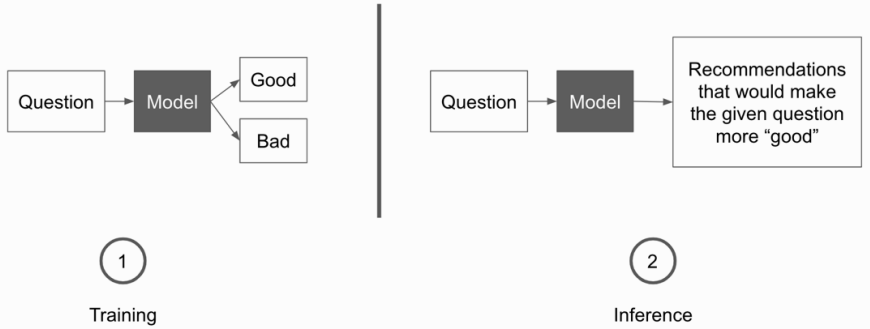


Figure 1-11. A middle ground between manual and end-to-end

Baseline; designing heuristics based on domain knowledge

Simple model; classifying text as good or bad, and using the classifier to generate recommendations

Complex model; training an end-to-end model that goes from bad text to good text


starting without ML is
the fastest way to build
an ML product

Build a Working Pipeline

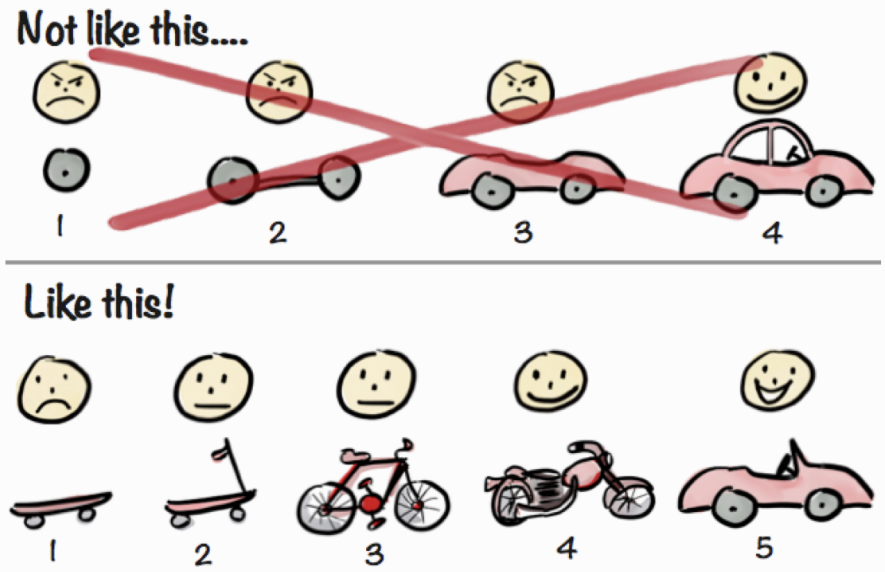


Figure II-1. The right way to build your first pipeline (reproduced with permission from Henrik Kniberg)

Prototype

Flesch readability score

The **Flesch–Kincaid readability tests** are readability tests designed to indicate how difficult a passage in English is to understand.

Count the words, sentences, and syllables and then calculate using a library.

Simple question:

```
$ python ml_editor.py  "Is this workflow any good?"
Adverb usage: 0 told/said, 0 but/and, 0 wh adverbs
Average word length 3.67, fraction of unique words 1.00
6 syllables, 5 words, 1 sentences
6 syllables, 100.26 flesch score: Very easy to read
```

Convoluted question:

```
$ python ml_editor.py  "Here is a needlessly obscure
question, that"\
"does not provide clearly which information it would"\
"like to acquire, does it?"

Adverb usage: 0 told/said, 0 but/and, 0 wh adverbs
Average word length 4.86, fraction of unique words 0.90
30 syllables, 18 words, 1 sentences
30 syllables, 47.58 flesch score: Difficult to read
```

However, you've noticed that returning only a probability of rejection to a user is not the most satisfying of outputs.

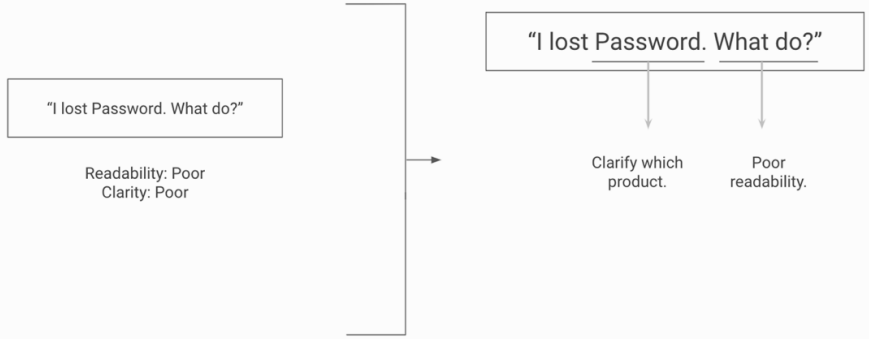


Figure 3-1. More actionable writing suggestions

Get a dataset

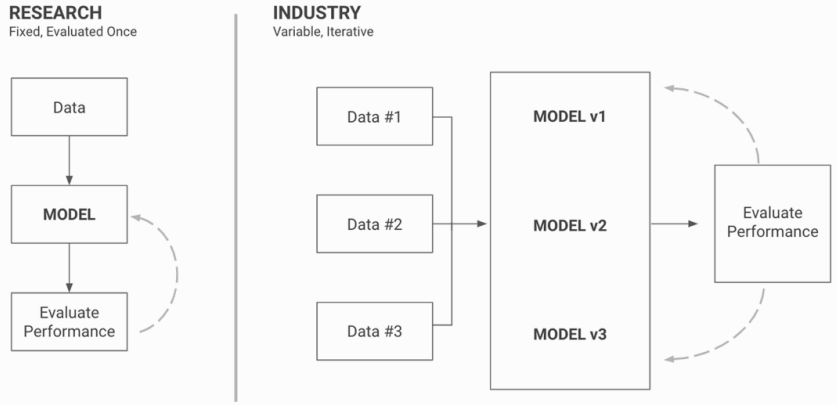
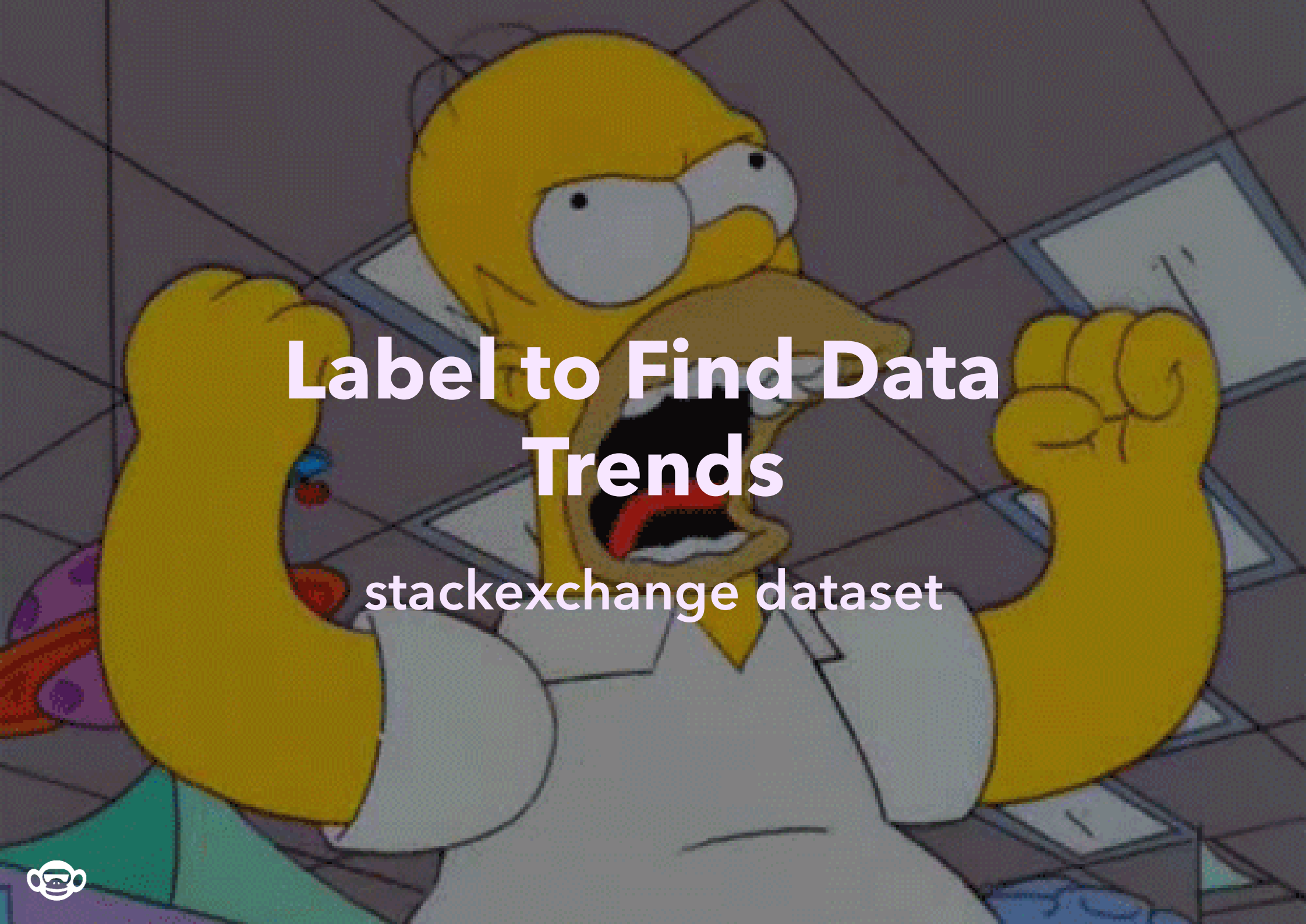


Figure 4-1. Datasets are fixed in research, but part of the product in industry


Label to Find Data Trends
stackexchange dataset

Build a heuristic using the data

In [166]:
```
# Most confident correct positive predictions
top_pos[to_display]
```

Out[166]:

Id	predicted_proba	true_label	Title	body_text	text_len	action_verb_full	question_mark_full	language_question
38358	0.84	True	Punctuation when using inline dialogue	I am a bit crazy about punctuation and I have a question that I'm struggling to find a consensus...	277	False	True	False
7602	0.81	True	Is it unusual for a flashback to have a very long dialogue?	This flashback is from a short story I'm writing (unedited first draft):\n\nI met Limei last sum...	870	True	True	False

In [167]:
```
# Most confident correct negative predictions
top_neg[to_display]
```

Out[167]:

Id	predicted_proba	true_label	Title	body_text	text_len	action_verb_full	question_mark_full	language_question
7878	0.20	False	When quoting a person's informal speech, how much liberty do you have to make changes to what th...	Even during a formal interview for a news article, people speak informally. They say "uhm", they...	116	True	True	False
16453	0.21	False	Printing by the Publisher	My first book was published through Xlibris. They have reported no sales from numerous authors, ...	131	True	True	False

Figure 5-10. Top-k most correct

Train and Evaluate Your Model

avoid using the best model and benchmark them and pick one with the best results

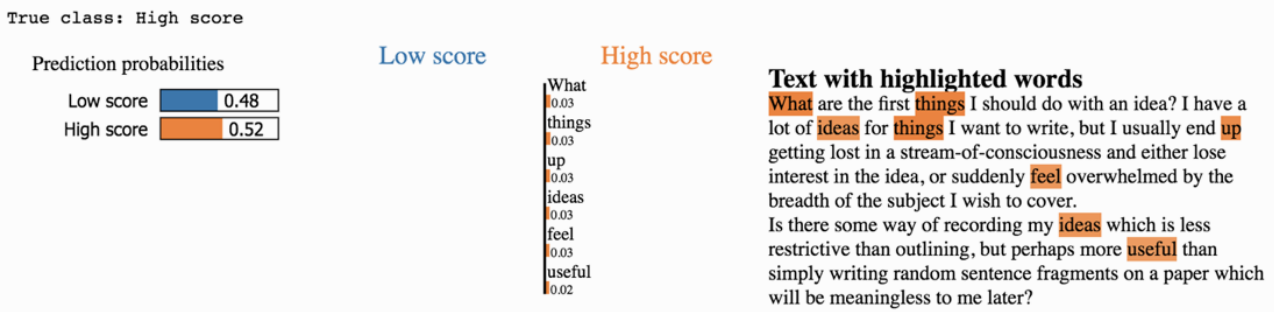
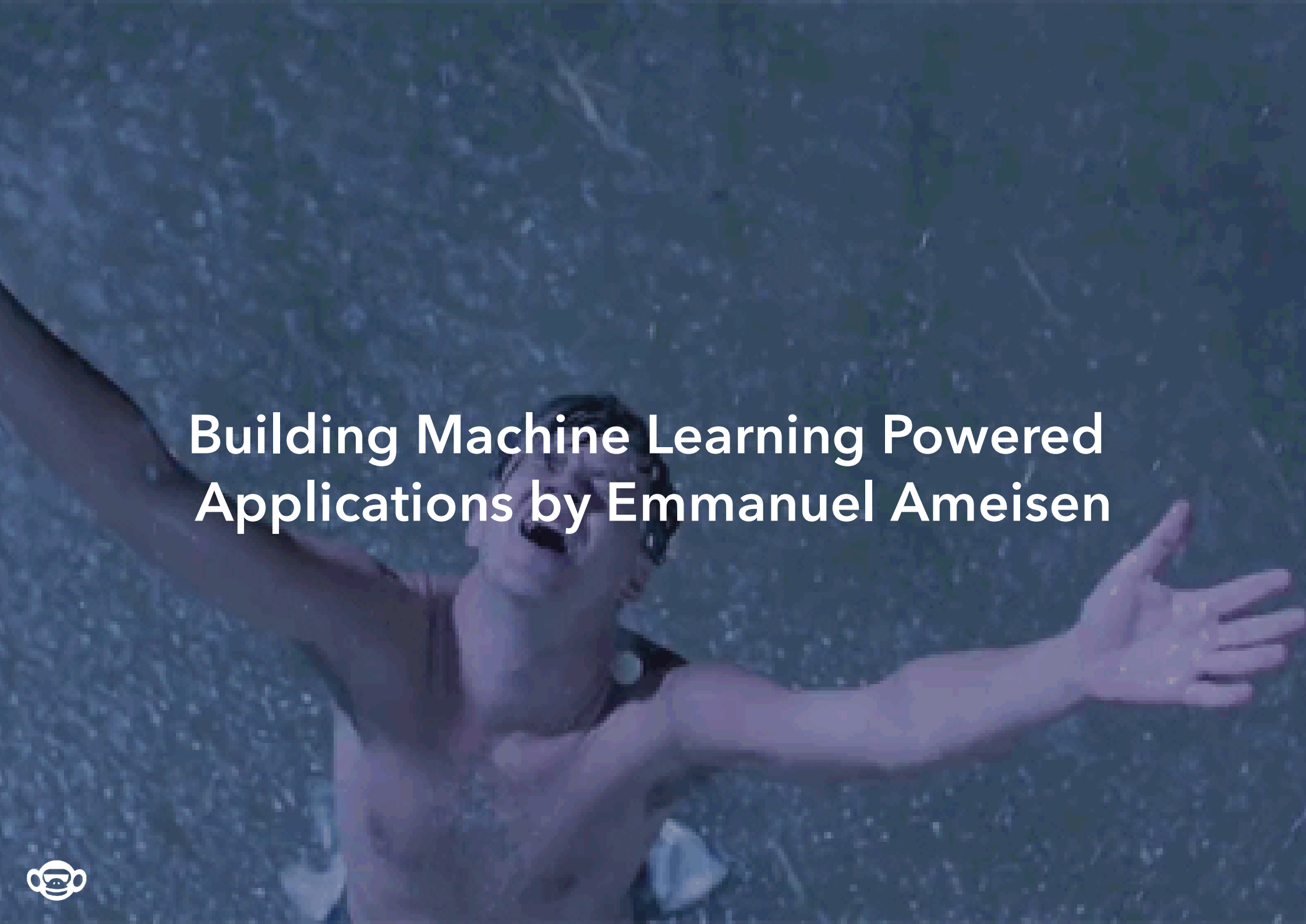


Figure 5-12. Explaining one particular example

```
// Following the first three recommendations
>> get_recommendation_and_prediction_from_text(
    """
I'd like to learn about building machine learning
products.
Are there any good product focused resources?
Would you be able to recommend educational books?
"""
)

0.48 score
Increase question length
Increase vocabulary diversity
Increase frequency of adverbs
No need to decrease frequency of question marks
Increase frequency of commas
```


Building Machine Learning Powered Applications by Emmanuel Ameisen


Thank you
gauthamsanthosh.com