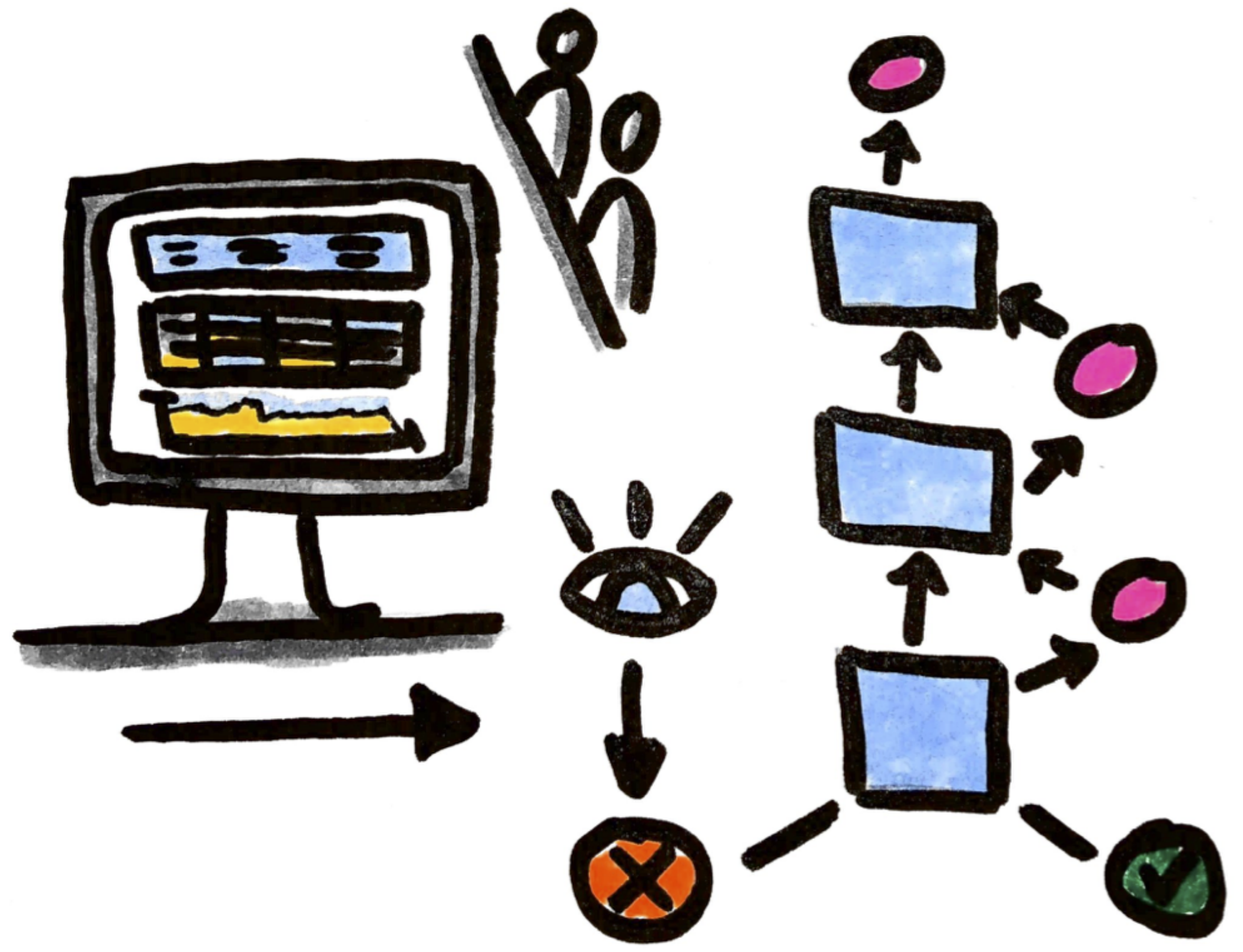
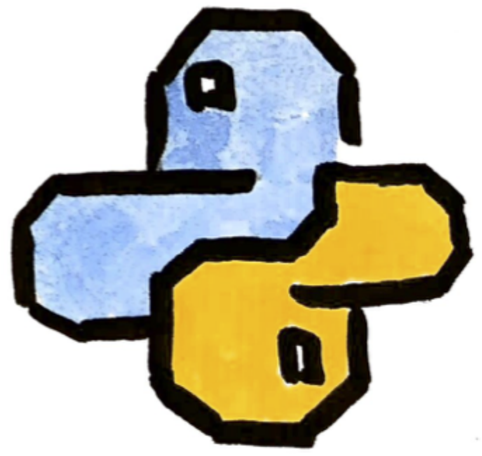
Production ready Data Science





About this Talk

- Interactively build a model that classifies internet posts
- Get a glimpse of production-readiness
- Learn about Luigi pipelines and their main components
- Write your production ready pipeline
- Get an overview of luigis modules

Building the model interactively

Download dataset

```
In [11]: !mkdir -p dataset
         !curl -L -o dataset/dataset.zip http://plainpixels.work/resources/datasets/reddit_
         ds_got.zip
         !unzip -u -q -d dataset/reddit dataset/dataset.zip
```

```
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Curren
t
                                 Dload  Upload   Total   Spent    Left  Speed
100  318k  100  318k    0     0   217k      0  0:00:01  0:00:01 --:--:--  217k
```

```
In [12]: !ls dataset/reddit
```

```
02-19-2018 02-20-2018 02-21-2018 02-22-2018 __MACOSX   training
```

Explore the data

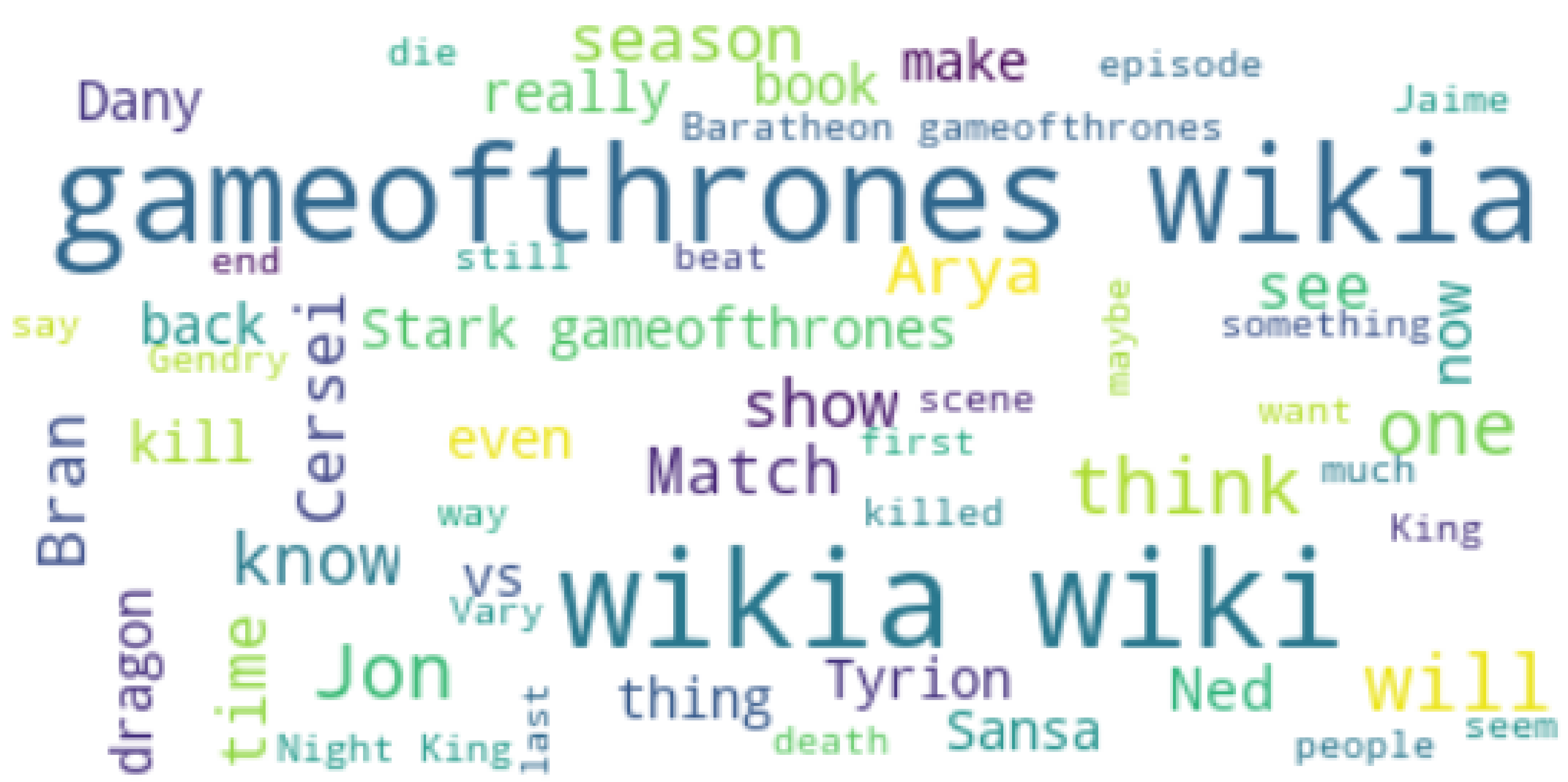
In [38]:
```
dataset = pandas.read_csv("dataset/reddit/training/data.csv",
                          encoding='utf-8',
                          sep=';').fillna('')
print(dataset.count())
print(dataset.describe())
dataset.head()
```

```
title        1000
selftext     1000
subreddit    1000
dtype: int64
                         title selftext    subreddit
count                     1000     1000         1000
unique                     999      708            2
top     Hiring Data Scientists           datascience
freq                         2      293          500
```

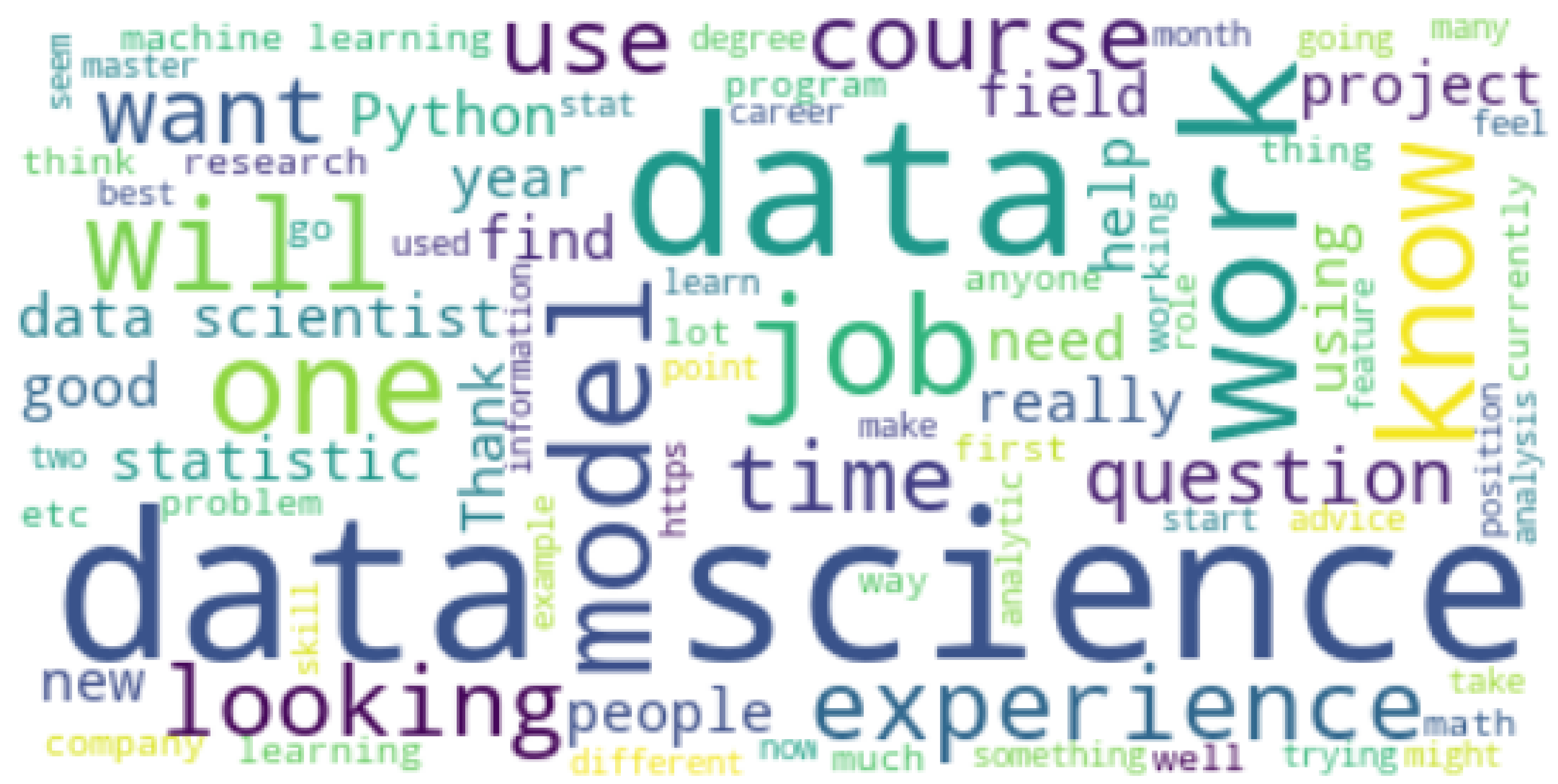
Out[38]:

	title	selftext	subreddit
0	Weekly 'Entering & Transitioning' Thread. Ques...	**Welcome to the very first 'Entering & Transi...	datascience
1	Data Science in Fashion		datascience
2	Evaluating our Startup using 3 versions of the...		datascience
3	Best place to read other people's code?	Hello,\n\nI'm starting to learn data science a...	datascience
4	What are the best practices for downloading da...	Downloading data from an API is a really commo...	datascience

In [61]:
```
got = " ".join(selftext for
               selftext in dataset[dataset["subreddit"]=="gameofthrones"].selftext
)
got_wordcloud = WordCloud(min_font_size=8,
                          max_words=100,
                          background_color="white").generate(got)


plt.figure(figsize = (8, 8), facecolor = None)
plt.imshow(got_wordcloud, interpolation='bilinear')
plt.axis("off")
plt.tight_layout(pad = 0)

plt.show()
```



In [62]:
```
ds = " ".join(selftext for selftext
              in dataset[dataset["subreddit"]=="datascience"].selftext)
ds_wordcloud = WordCloud(min_font_size=8,
                         max_words=100,
                         background_color="white").generate(ds)

plt.figure(figsize = (8, 8), facecolor = None)
plt.imshow(ds_wordcloud, interpolation='bilinear')
plt.axis("off")
plt.tight_layout(pad = 0)

plt.show()
```

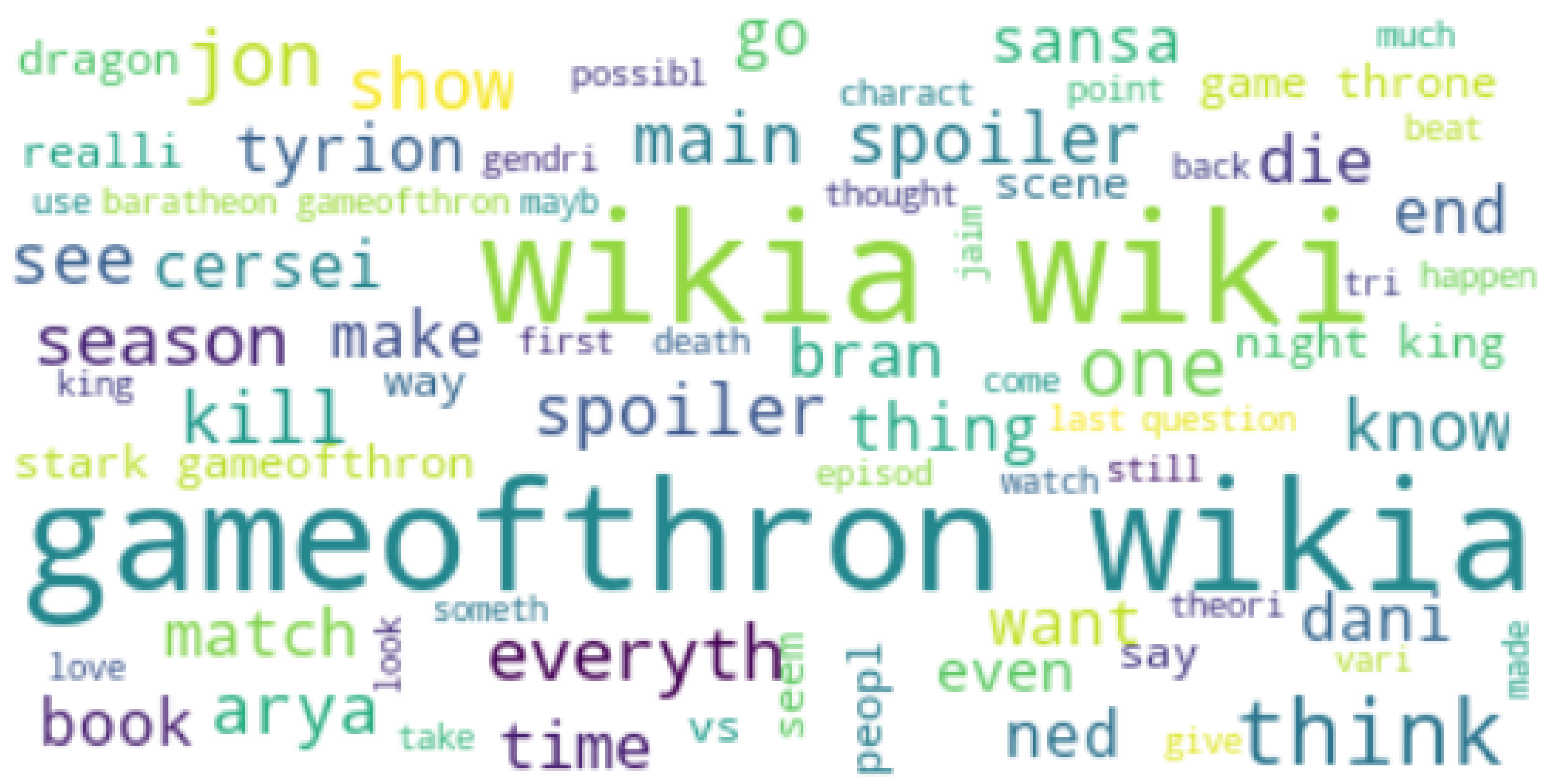


```
In [59]: tokenizer = nltk.tokenize.RegexpTokenizer(r'\w+')
         stopwords = nltk.corpus.stopwords.words('english')
         stemmer = nltk.SnowballStemmer("english")

         def clean_words(post):
             tokenized = tokenizer.tokenize(post["title"] + " " + post["selftext"])
             lowercase = [word.lower() for word in tokenized]
             filtered = [word for word in lowercase if word not in stopwords]
             stemmed = [stemmer.stem(word) for word in filtered]
             return " ".join(stemmed)

         dataset["cleaned_words"] = dataset.apply(clean_words, axis=1)

         dataset.describe()
```

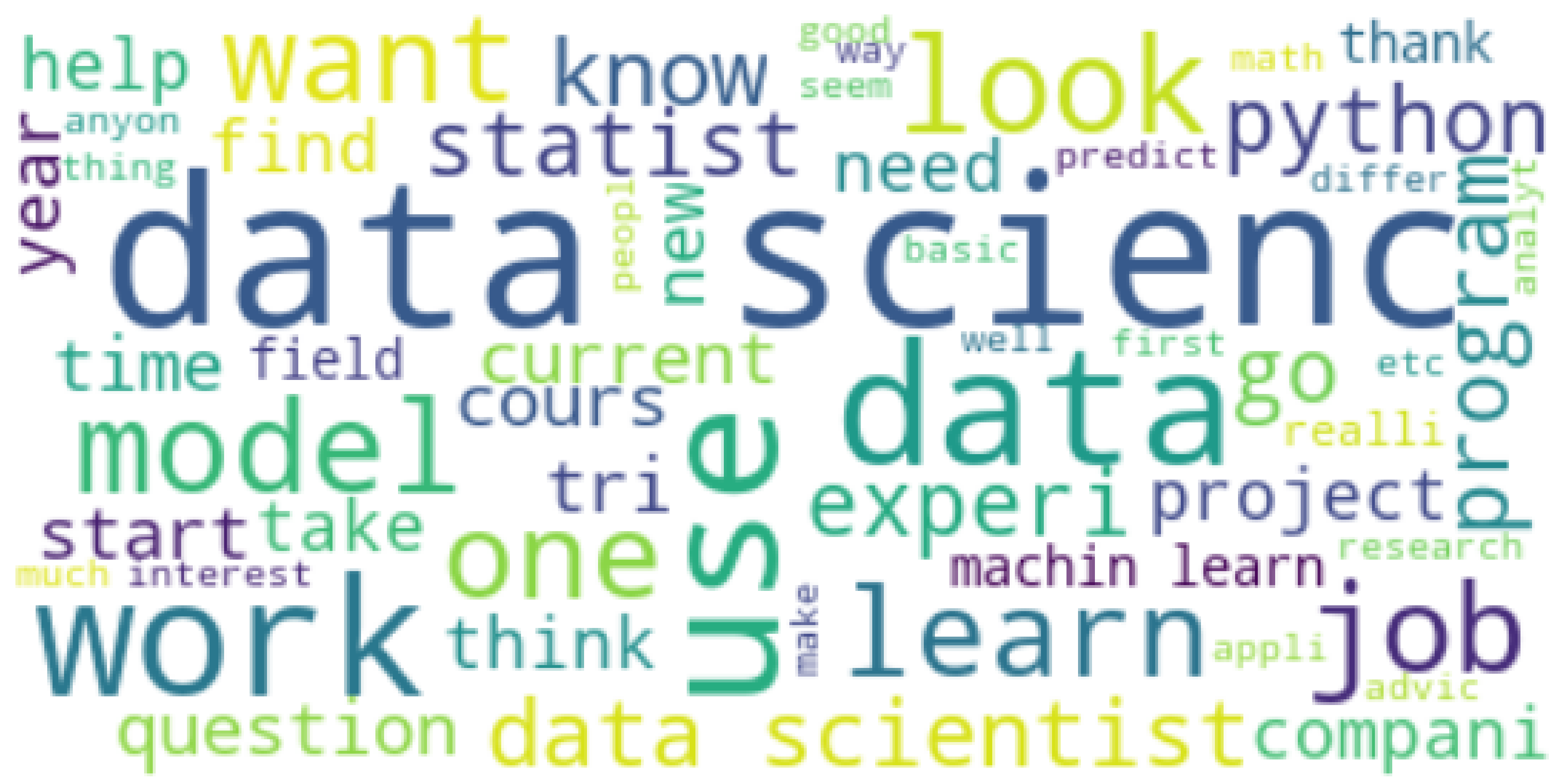
Out[59]:

	title	selftext	subreddit	cleaned_words
count	1000	1000	1000	1000
unique	999	708	2	1000
top	Hiring Data Scientists		datascience	month month member select hello frand got inte...
freq	2	293	500	1

```
In [60]: got_clean = " ".join(selftext for selftext
                              in dataset[dataset["subreddit"]=="gameofthrones"].cleaned_wor
         ds)
         got_wordcloud_clean = WordCloud(min_font_size=8,
                                         max_words=100,
                                         background_color="white").generate(got_clean)


         plt.figure(figsize = (8, 8), facecolor = None)
         plt.imshow(got_wordcloud_clean, interpolation='bilinear')
         plt.axis("off")
         plt.tight_layout(pad = 0)

         plt.show()
```



In [64]:
```
ds_clean = " ".join(selftext for selftext
                    in dataset[dataset["subreddit"]=="datascience"].cleaned_words)
ds_wordcloud_clean = WordCloud(min_font_size=8,
                               max_words=100,
                               background_color="white").generate(ds_clean)


plt.figure(figsize = (8, 8), facecolor = None)
plt.imshow(ds_wordcloud_clean, interpolation='bilinear')
plt.axis("off")
plt.tight_layout(pad = 0)

plt.show()
```



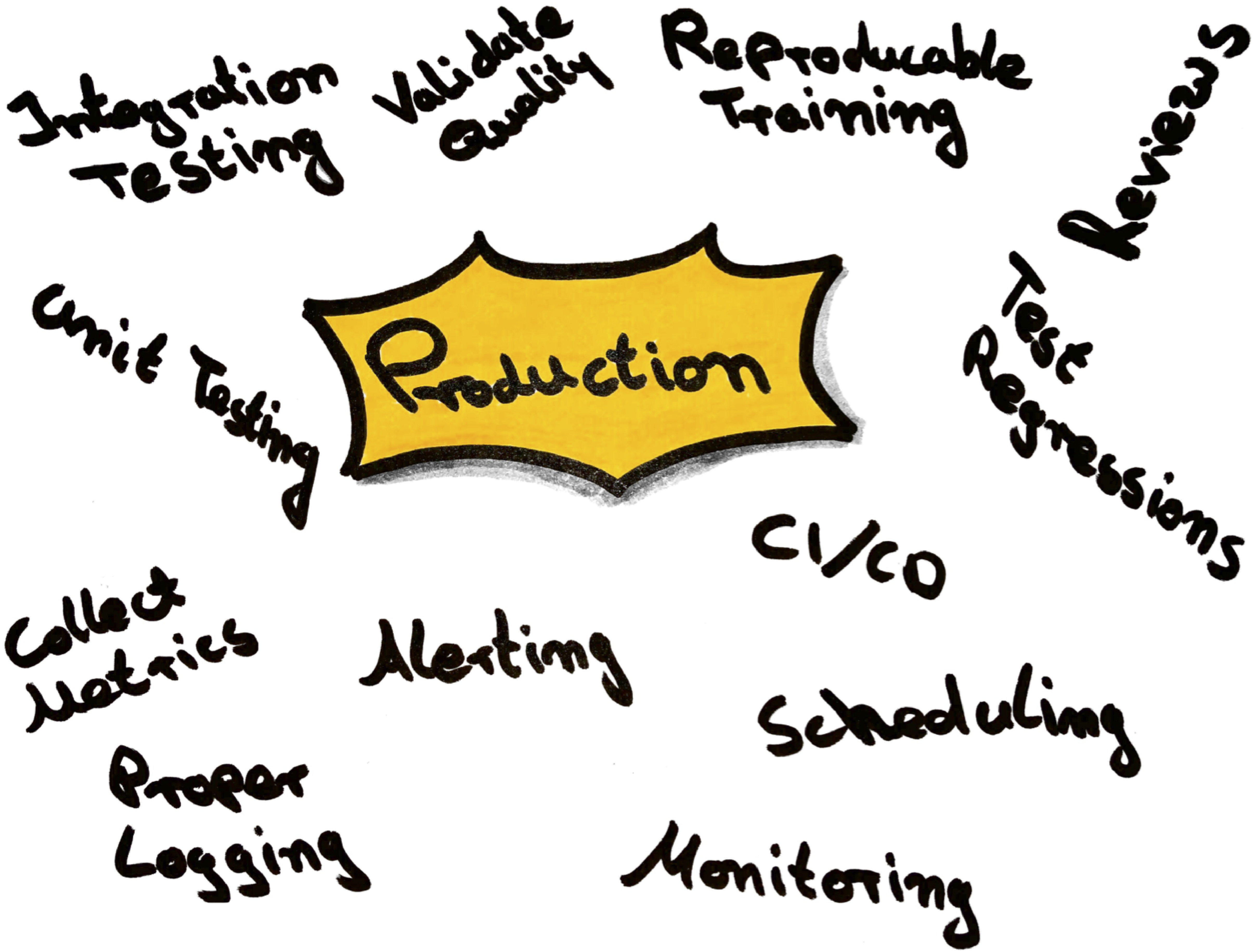
```
In [65]: with open("dataset/reddit/training/clean.csv", "w") as out:
                 dataset[["cleaned_words", "subreddit"]].to_csv(out,  encoding='utf-8', ind
         ex=False, sep=';')
```

Build the model

In [ ]:

```
# Lade die bereinigten Daten
df = sql.read.format("com.databricks.spark.csv") \
    .option("header", "true") \
    .option("delimiter", ";") \
    .load("dataset/reddit/training/clean.csv")

# Den Klassifikator trainieren
labeled = df.withColumn("label", df.subreddit.like("datascience").cast("double"))
train_set, test_set = labeled.randomSplit([0.8, 0.2])
tokenizer = Tokenizer().setInputCol("cleaned_words").setOutputCol("tokenized")
hashing = HashingTF().setNumFeatures(1000).setInputCol("tokenized").setOutputCol(
"features")
decision_tree = DecisionTreeClassifier()
pipeline = Pipeline(stages=[tokenizer, hashing, decision_tree])
model = pipeline.fit(train_set)
```

It works, now DEPLOY it!


Integration Testing
Validate Quality
Reproducable Training
Reviews
Unit Testing
Production
Test Regressions
CI/CD
Collect Metrics
Alerting
Scheduling
Proper Logging
Monitoring

A bit about Luigi

Luigi helps to stitch long running tasks together into pipelines

It contains a wide toolbox of task templates (e.g. Hive, Pig, Spark, Python)

How to compose workflows?

A workflow consists of Tasks, Targets and Parameters

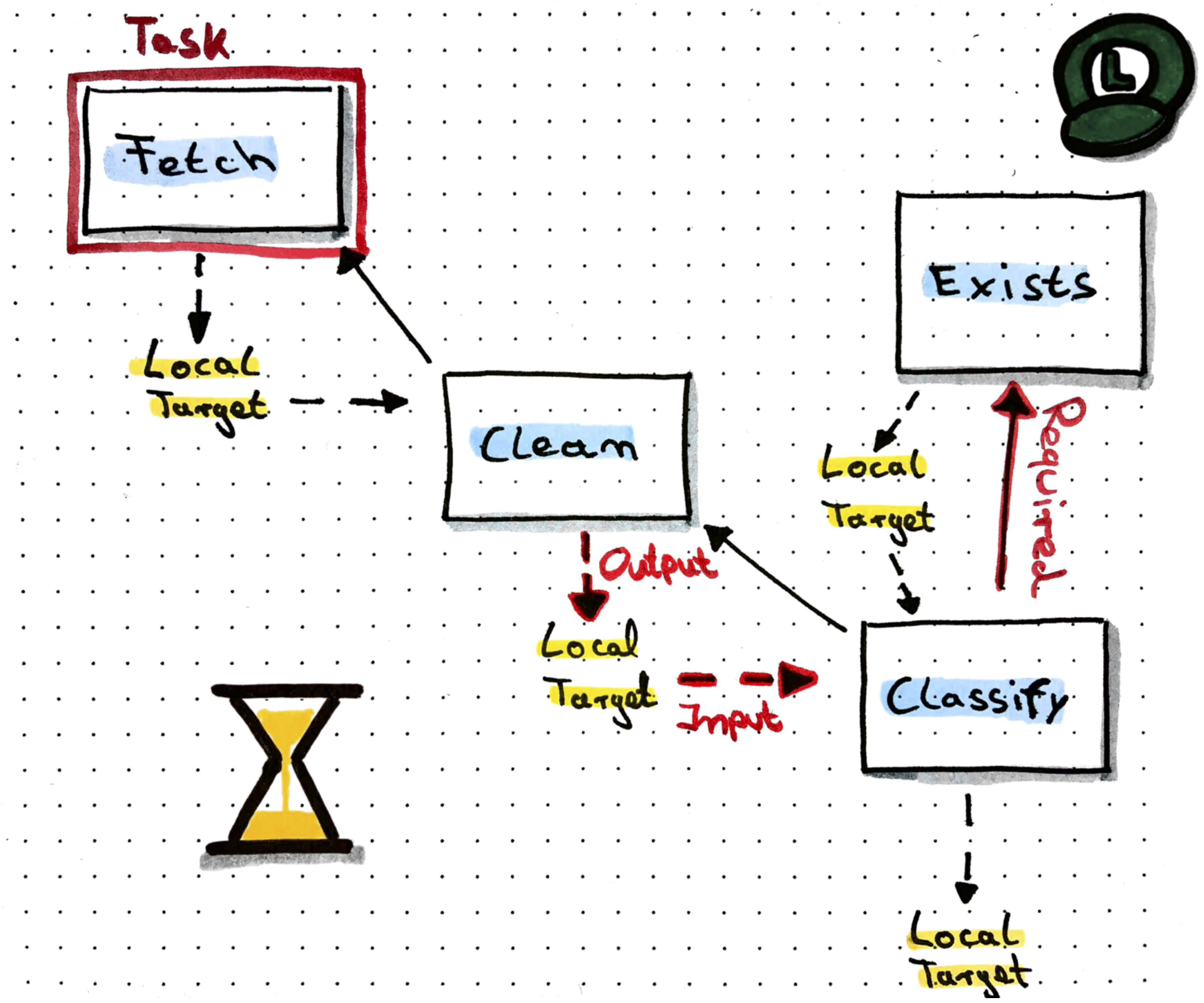
Targets correspond to a file or a database entry or some other kind of checkpoint

Tasks consume Targets of other tasks, run a computation, then output a target

Parameters take care of task parameterization

How would our Workflow look like?

- Download the dataset
- Clean the data
- Check for existing classifier
- Classify the posts and save result


Task
Fetch
Local Target
Clean
Output
Local Target
Input
Exists
Local Target
Required
Classify
Local Target