



Dasking in the Sun

Applying Parallel Operations to your Pandas Transformations

What do you do when your
data become too large? Is it
CPU-bound? Or memory-
bound?

Dask docs provide guidance

 DASK

Dask Tutorial

Search docs

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Get Started Algorithms Setup Community

You can run this notebook in a [live session](#) [launch binder](#) or view it [on Github](#).

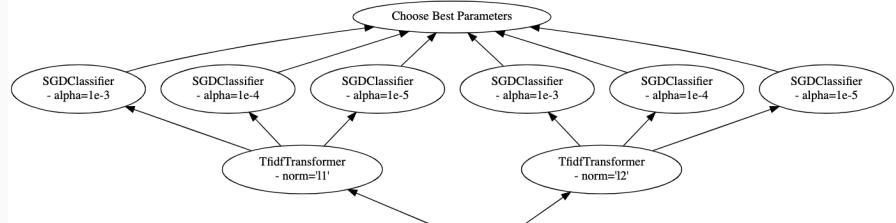
Parallel and Distributed Machine Learning

[Dask-ML](#) has resources for parallel and distributed machine learning.

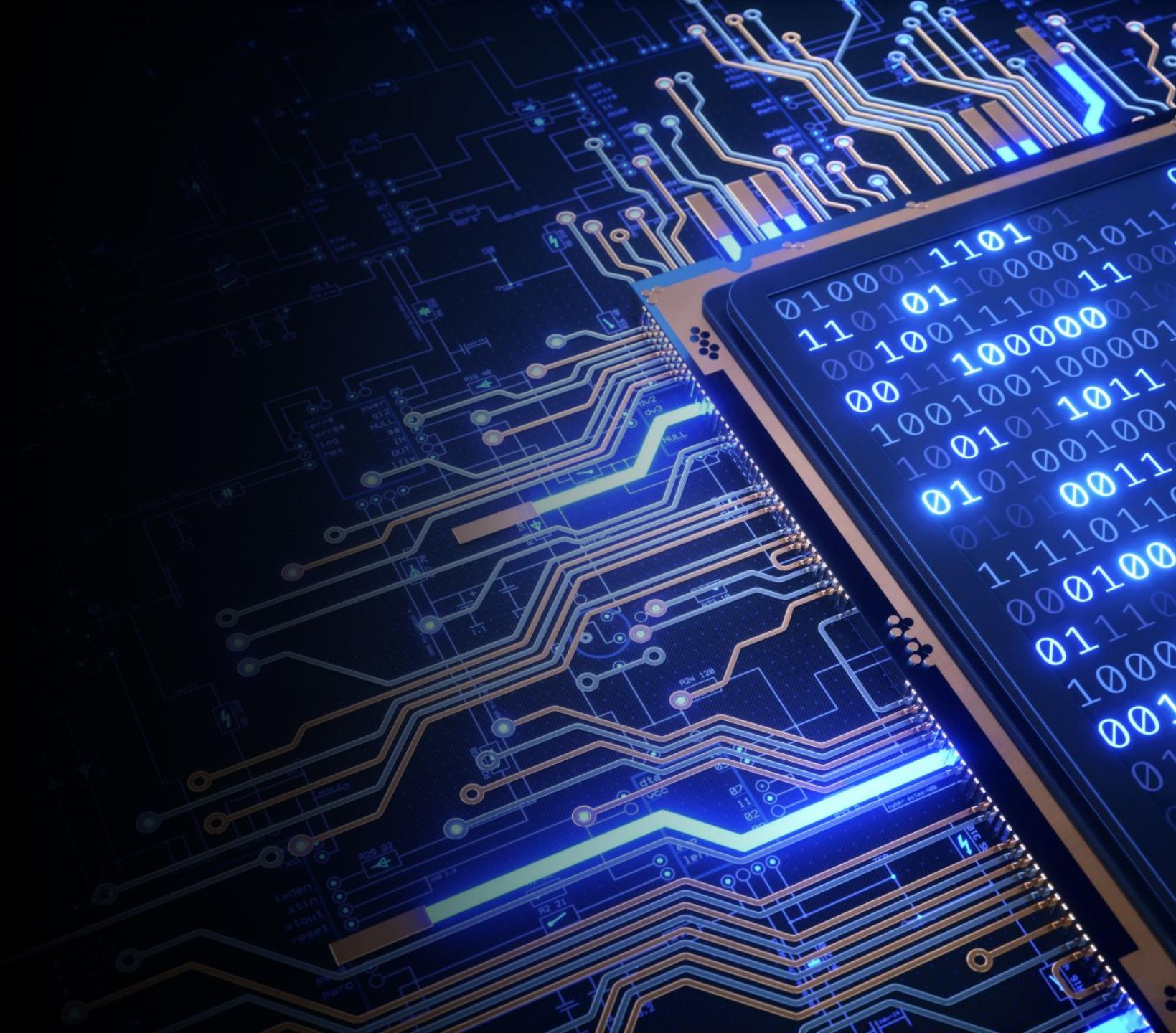
Types of Scaling

There are a couple of distinct scaling problems you might face. The scaling strategy depends on which problem you're facing.

1. CPU-Bound: Data fits in RAM, but training takes too long. Many hyperparameter combinations, a large ensemble of many models, etc.
2. Memory-bound: Data is larger than RAM, and sampling isn't an option.



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- **RAM:** Your computer's short-term data storage. Can be accessed quickly.
 - **Cores:** Modern CPUs offer cores and hyper-threading. A dual-core has 2 CPUs, quad-core has 4 CPUs, octo-core has 8, and so on.
 - Processes tend to be memory-bound or CPU-bound, meaning that either the data are very large and you might run out of memory, or the number of computations is so great that you might run out of CPU.



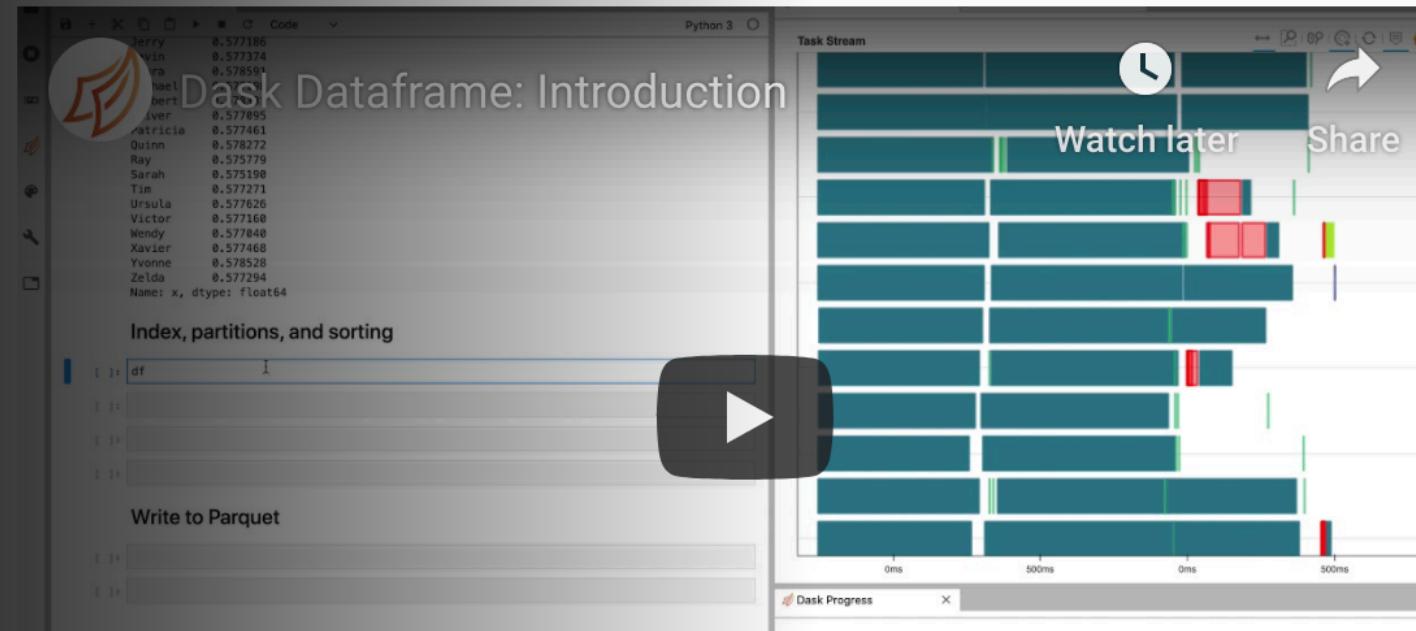


- Today's code was run on:
- Python virtualenv created with venv
- Requirements are in requirements.txt
- Python 3.7.6
- MacOS

DASK

DataFrame

A Dask DataFrame is a large parallel DataFrame composed of many smaller Pandas DataFrames split along the index. These Pandas DataFrames may live on disk for larger-than-memory data, on a single machine, or on many different machines in a cluster. One Dask DataFrame operation triggers many operations on the constituent Pandas DataFrames.





- The basic concept of Dask is to split data/computation up across a computer's CPU.

- Dask is installable:

```
$conda install dask
```

```
$pip install dask
```

- Or from source:

```
$git clone https://github.com/dask/dask.git
```

```
$cd dask
```

```
$python setup.py install
```

Dask

- Can scale from a laptop to a cluster
- Has the concept of arrays and dataframes
- Has several ways of distributing tasks and scheduling them, including dask.delayed
- Has dask-ml, parallelized machine learning that works alongside scikit-learn (scikit-learn already has joblib, but Dask extends this package to clusters)

[Get Started](#)[Algorithms](#)[Setup](#)[Community](#)

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Dataframe

<code>DataFrame(dsk, name, meta, divisions)</code>	Parallel Pandas DataFrame
<code>DataFrame.add(other[, axis, level, fill_value])</code>	Get Addition of dataframe and other, element-wise (binary operator <code>add</code>).
<code>DataFrame.append(other[, interleave_partitions])</code>	Append rows of <code>other</code> to the end of caller, returning a new object.
<code>DataFrame.apply(func[, axis, broadcast, ...])</code>	Parallel version of <code>pandas.DataFrame.apply</code>
<code>DataFrame.assign(**kwargs)</code>	Assign new columns to a DataFrame.
<code>DataFrame.astype(dtype)</code>	Cast a pandas object to a specified dtype <code>dtype</code> .
<code>DataFrame.categorize([columns, index, ...])</code>	Convert columns of the DataFrame to category dtype.
<code>DataFrame.columns</code>	
<code>DataFrame.compute(**kwargs)</code>	Compute this dask collection
<code>DataFrame.corr([method, min_periods, ...])</code>	Compute pairwise correlation of columns, excluding NA/null values.
<code>DataFrame.count([axis, split_every])</code>	Count non-NA cells for each column or row

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- Multiprocess: <https://docs.python.org/3/library/multiprocessing.html>
 - Modin: <https://modin.readthedocs.io/en/latest/>
 - Swifter: <https://pypi.org/project/swifter/>
 - Ray: <https://pypi.org/project/ray/>
 - Pandarallel: <https://pypi.org/project/pandarallel/>
 - Dask: <https://dask.org/>

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- vectorization
 - .iterrows()
 - .apply()
 - .itertuples()
 - <https://medium.com/swlh/why-pandas-itertuples-is-faster-than-iterrows-and-how-to-make-it-even-faster-bc50c0edd30d>

