RAPIDS

An Overview of cuDF

@RAPIDSai

https://github.com/rapidsai

https://rapids-goai.slack.com/join

RAPIDS

https://rapids.ai

“

RAPIDS brings open-source GPU acceleration to data science and data engineering

”

General Purpose and Domain-Specific Libraries

cuDF

- GPU-accelerated ETL functions
- Tracks Pandas and other common PyData APIs
- Dask + UCX integration for scaling

RAPIDS for Apache Spark

- RAPIDS accelerator for Apache Spark

RAPIDS ML

- GPU-native cuML library, plus XGBoost, FIL, HPO, and more

cuGraph

- GPU graph analytics, including Louvain, PageRank, and more
- Multi node Multi GPU features

cuxfilter

- GPU-accelerated cross-filtering

Viz integration

- pyViz: Plotly Dash, Bokeh, Datashader, HoloViews, hvPlot
- Node-RAPIDS bindings for node.js

Domain-Specific Libraries

CLX + Morpheus
Cyber log processing + anomaly detection

cuStreamz
Streaming analytics

cuSignal
Signals processing

cuCIM
Computer vision & image processing primitives

...and more!

cuSpatial
Spatial analytics

NVTabular
RecSys ETL library

Minor Code Changes for Major Benefits

Abstracting Accelerated Compute through Familiar Interfaces

CPU

GPU

pandas

```
>>> import pandas as pd
>>> df =
pd.read_csv("filepath")
```

cuDF

```
>>> import cudf
>>> df =
cudf.read_csv("filepath")
```

Average Speed-Ups: *150x*

CPU Spark

```
spark.sql("""
select
        order
        count(*) as order_count
from
        orders""")
```

GPU Spark

```
spark.conf.set("spark.plugins
","com.nvidia.spark.SQLPlugin")

spark.sql("""
select
        order
        count(*) as order_count
from
        orders""")
```

Average Speed-Ups: *10x*

scikit-learn

```
>>> from sklearn.ensemble
import
RandomForestClassifier
>>> clf =
RandomForestClassifier()
>>> clf.fit(x, y)
```

cuML

```
>>> from cuml.ensemble import
RandomForestClassifier
>>> cuclf =
RandomForestClassifier()
>>> cuclf.fit(x, y)
```

Average Speed-Ups: *50x*

NetworkX

```
>>> import networkx as nx
>>> page_rank =
nx.pagerank(graph)
```

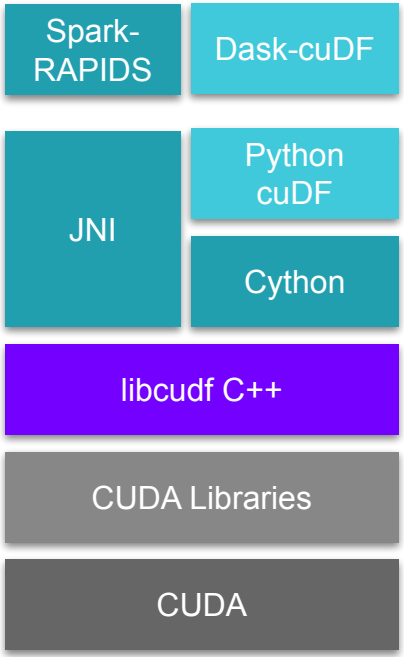
cuGraph

```
>>> import cugraph
>>> page_rank =
cugraph.pagerank(graph)
```

Average Speed-Ups: *250x*

What is RAPIDS ETL

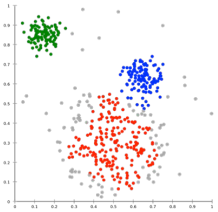
Expandable platform for GPU data science

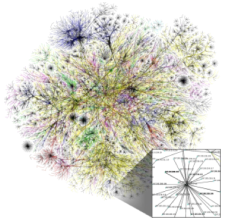


- **libcuDF**
  - High-performance C++ layer with GPU-optimized CUDA kernels, data types, operations, and primitives
- **cuDF**
  - Familiar pandas-like Python API
- **Dask-cuDF**
  - Multi-node, multi-GPU scaling for Dask DataFrames and SQL with easy deployment for Python users
- **Spark-RAPIDS**
  - Zero-code-change Apache Spark and Apache Spark SQL acceleration

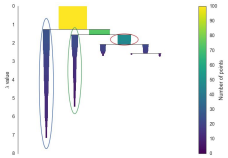
Algorithms

Accelerated Data Science





dmlc XGBoost



- **cuML**
  - Classification / Regression
  - Clustering / Dimensionality Reduction
  - Time Series
  - Decision Trees / Random Forests
- **cuGraph**
  - Sampling
  - Tree / Structure
  - Community
- **XGBoost**
  - “XGBoost is all you need”
- **HDBSCAN**
  - Soft clustering
  - Approximate predict

RAPIDS Everywhere

Integrating where data science is done

- RAPIDS now has over 100 integrations, covering both open source and commercial software
- Easily accelerate the AutoML, interpretability, plotting or domain-specific modeling tools of your choice
- Both RAPIDS-sponsored and community integrations growing every day
- For projects already using Pandas / Scikit-learn / NetworkX, integration is often a few lines of code
- Have you integrated RAPIDS into a project we haven't mentioned? Join our Slack and tell us about it! (https://rapids.ai/slack-invite)

Expanding Access to RAPIDS

New platforms, new communities

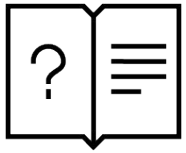
- Windows Subsystem for Linux (WSL) support is now GA

- ARM SBSA support is now GA

- RAPIDS can now be installed via Pip, Python's standard package manager (Experimental)

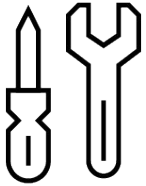
How to Get Started with RAPIDS

A Variety of Ways to Get Up & Running



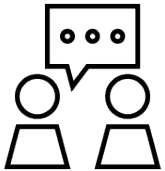
More about RAPIDS

- Learn more at RAPIDS.ai
- Read the API docs
- Check out the RAPIDS blog
- Read the NVIDIA DevBlog



Self-Start Resources

- Get started with RAPIDS
- Deploy on the Cloud today
- Start with SageMaker Studio Lab
- Look at the cheat sheets



Discussion & Support

- Check the RAPIDS GitHub
- Use the NVIDIA Forums
- Reach out on Slack
- Talk to NVIDIA Services

Get Engaged

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