

Prototype for a CTA Real-Time-Analysis

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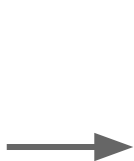
1. RTA Prototype
2. Analysis Results
3. Runtime Performance



The Prototype

Steps performed by the RTA prototype:

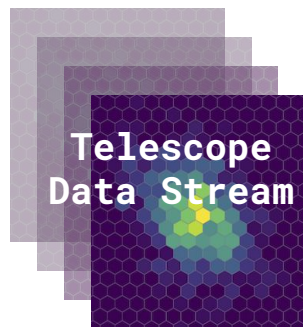
1. Read Images
2. Perform Image Cleaning
3. Extract Hillas Parameters
4. Reconstruct Direction
5. Random Forest Energy Regression
6. Random Forest Gamma/Hadron Classification
7. Write Results



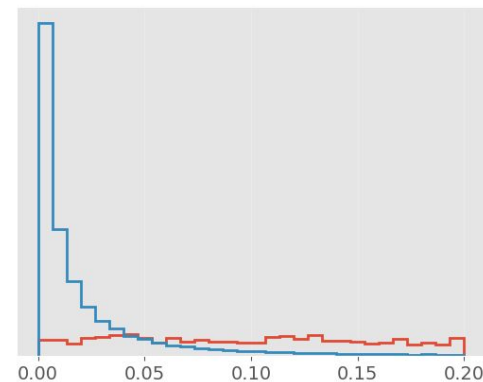
Simulated Type	Width	Length
gamma	50	153



model persisted to
file or database



Type	Energy	Ra	Dec
hadron	60	4.9	24.3



Goal for the RTA prototype:

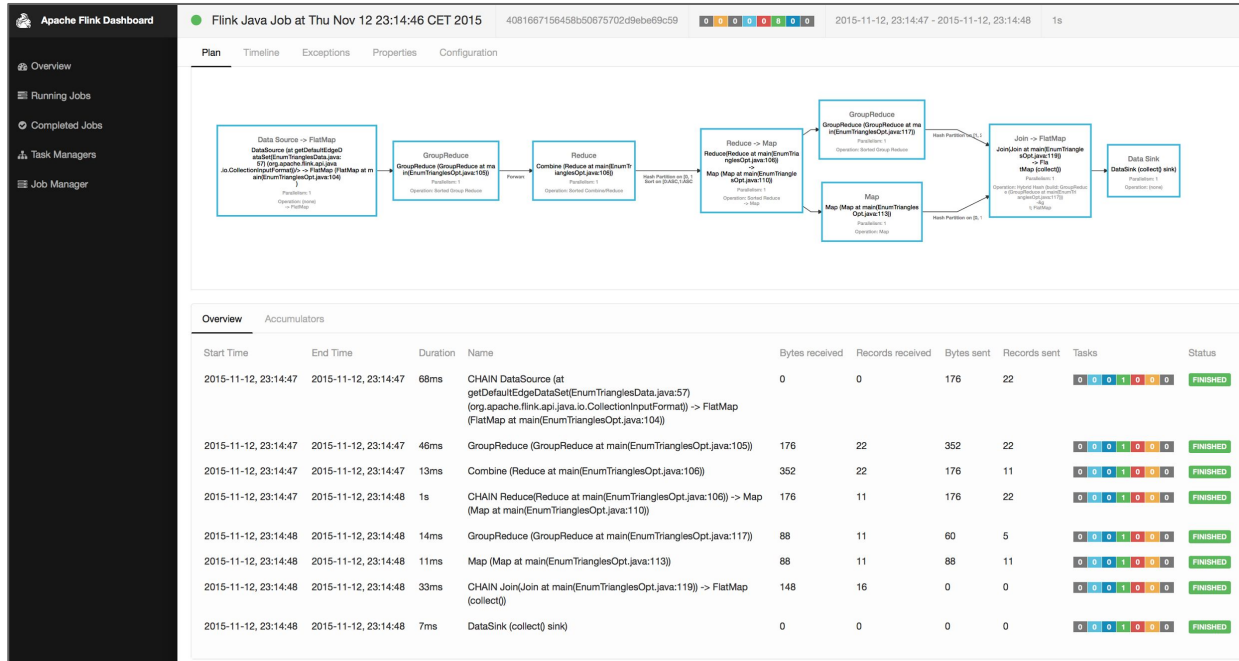
Leverage Big-Data frameworks to distribute streamed computing to several computers.

Wikipedia on Apache Flink:

Flink provides a high-throughput, low-latency streaming engine^[7] as well as support for event-time processing and state management. Flink applications are fault-tolerant in the event of machine failure and support exactly-once semantics.^[8] Programs can be written in Java, Scala,^[9] Python,^[10] and SQL^[11] and are automatically compiled and optimized^[12] into dataflow programs that are executed in a cluster or cloud environment.^[13]



In simpler terms:
Apache Flink is nice for distributing streamed computations.

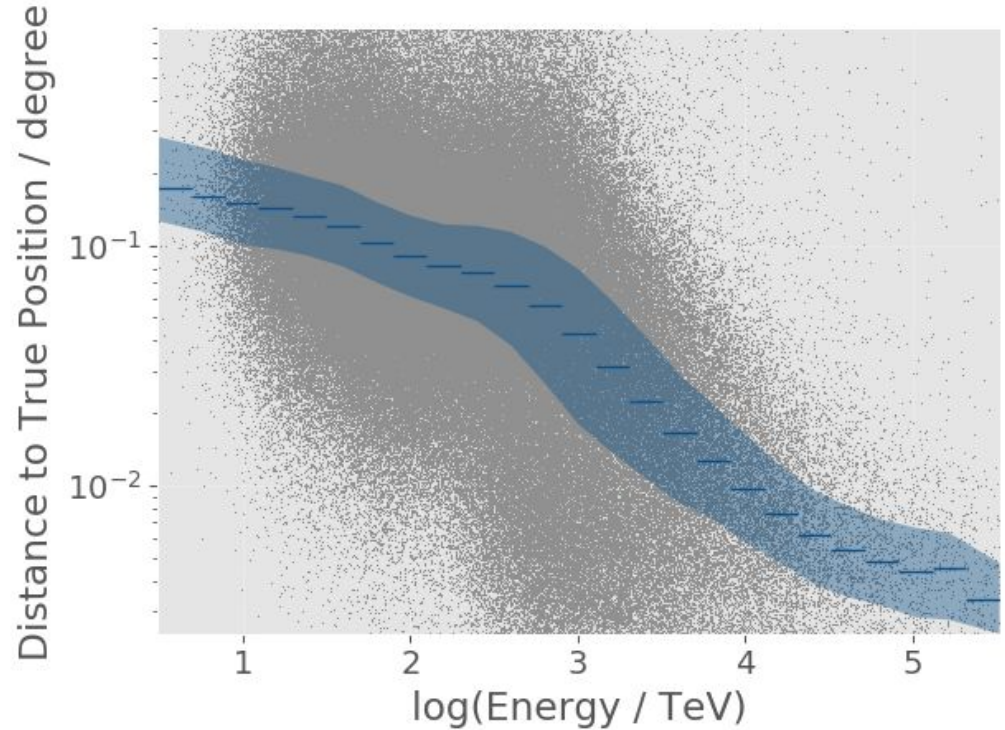


A photograph of a large industrial facility, likely a water treatment plant, featuring a complex network of colorful pipes (blue, yellow, red, green) and large green pumps. The scene is brightly lit with overhead industrial lights. The text "Analysis Results" is centered over the image.

Analysis Results

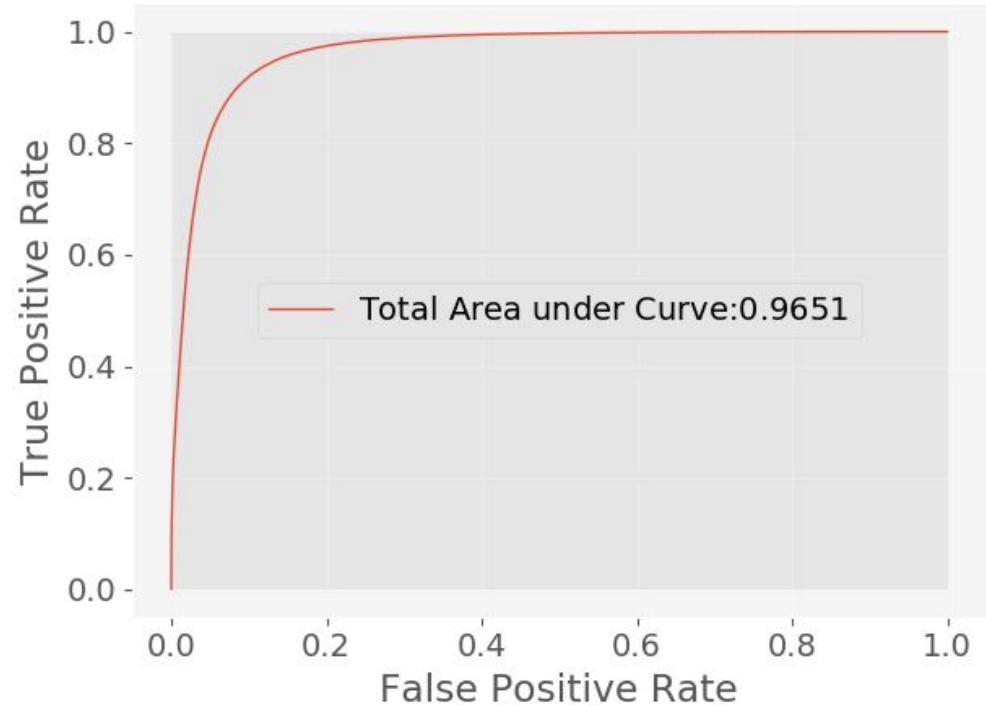
Direction Reconstruction

Implementation of reconstruction algorithm from ctapipe.



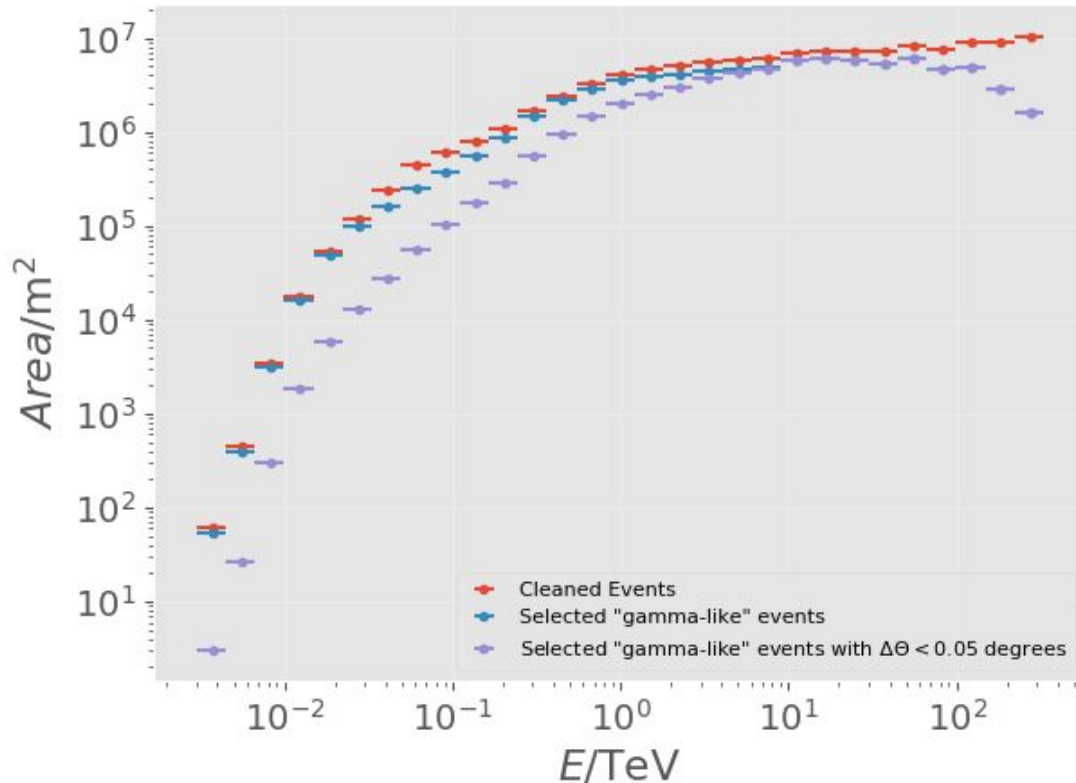
Classification Performance

One single Random Forest for all telescope types.



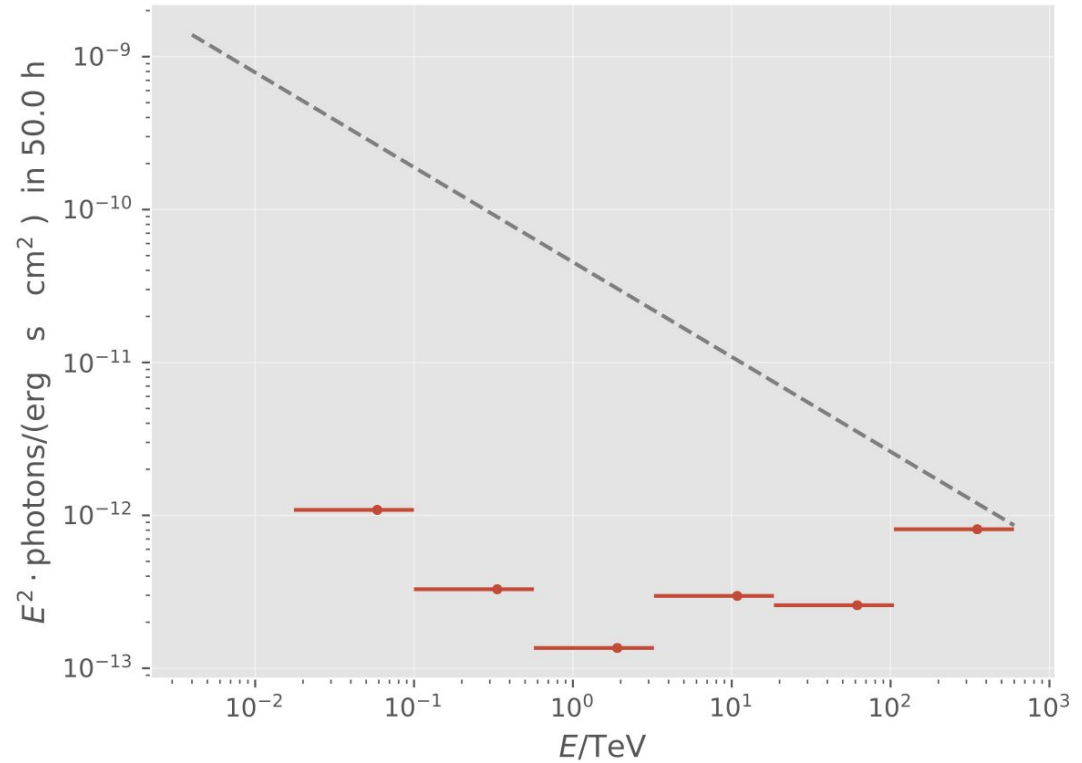
Effective Area

Effective Area for different event selections.



Sensitivity

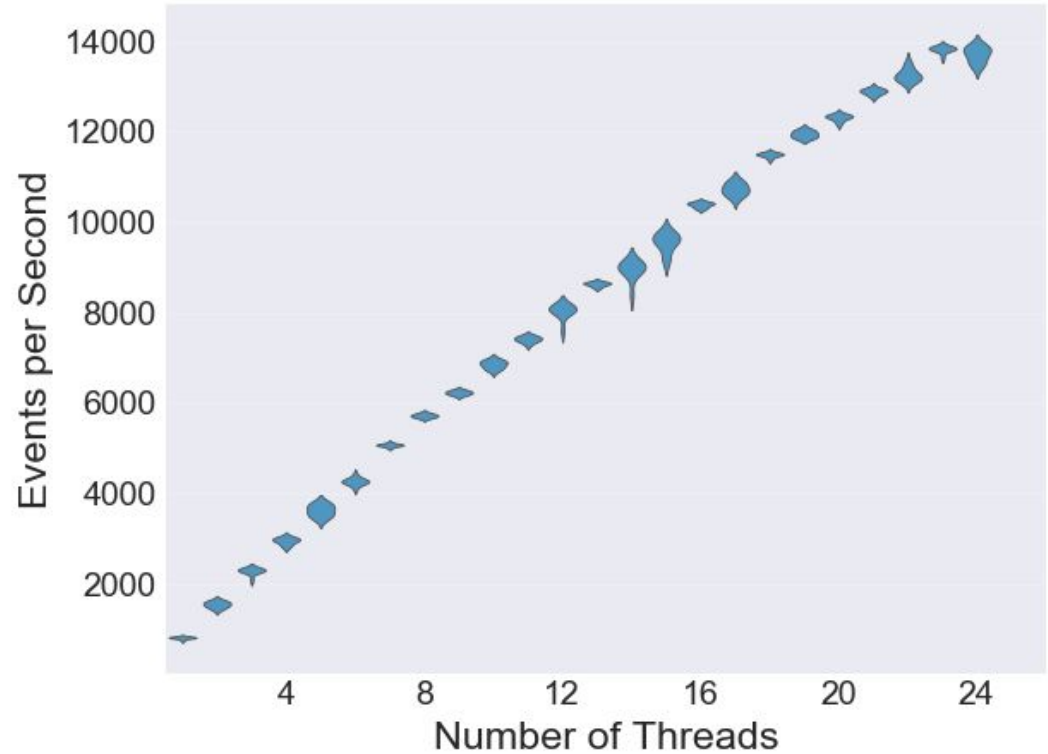
Preliminary sensitivity for the RTA prototype.



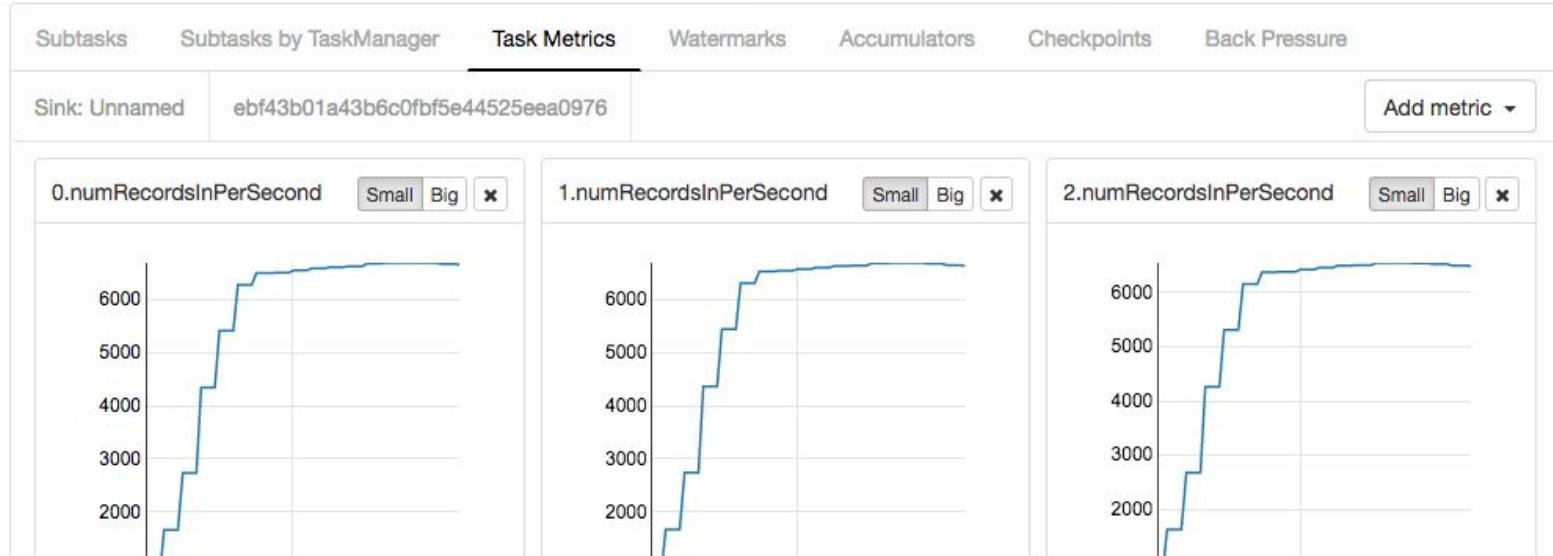
A photograph of a large industrial facility, likely a water treatment plant, featuring a long, straight aisle lined with complex machinery and a dense network of colorful pipes (blue, yellow, red, green) running overhead and along the walls. The scene is brightly lit with overhead industrial lights.

Runtime Performance

Eventrate on a single machine
with 24 cores.



~20 000 events/s on two machines.



A wide-angle photograph of a large industrial facility, likely a water treatment plant or a chemical processing plant. The image shows a long, straight aisle with a polished floor. On both sides of the aisle, there are rows of industrial equipment, including large green and blue tanks, and complex piping systems. The pipes are painted in various colors: blue, yellow, red, and green, which helps in identifying different lines. The ceiling is high, with numerous pipes and structural beams visible. The overall atmosphere is clean and organized.

Conclusion

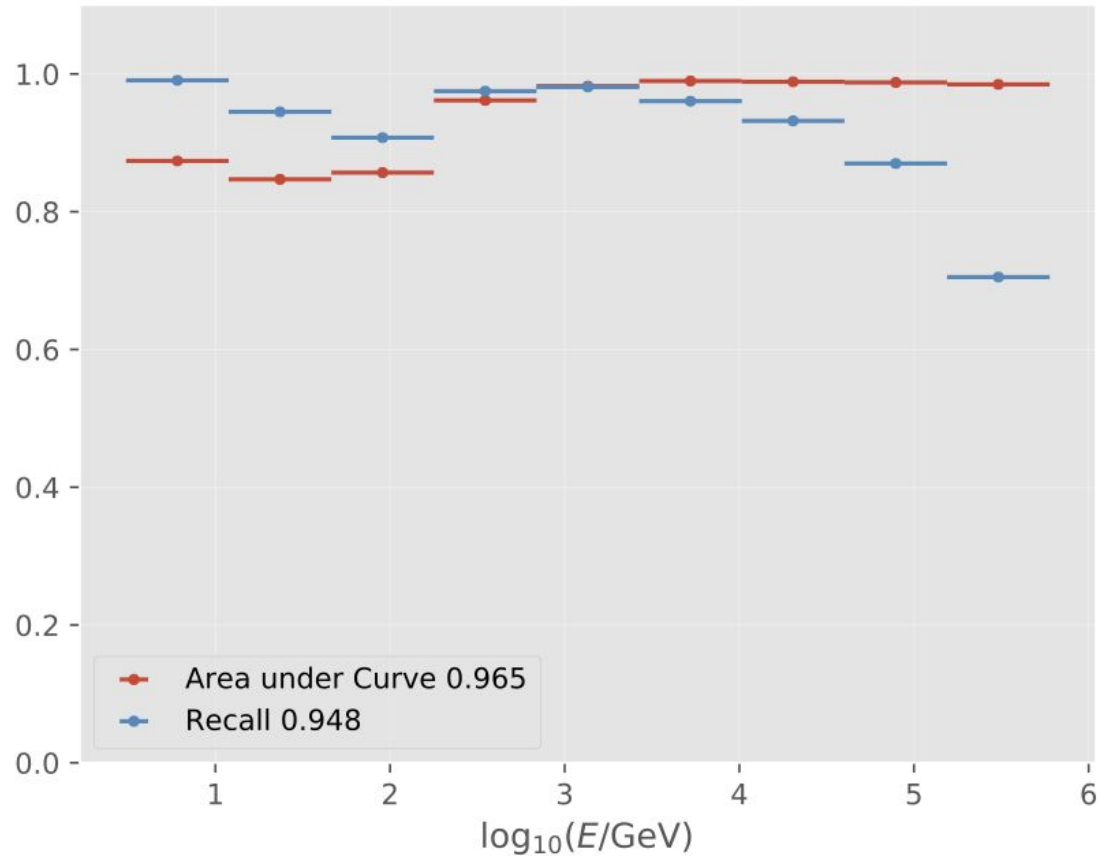
DL3 event lists from images in real time using industry standards for
scalable stream computing



GitHub

github.com/mackaiver/jayct

Backup I



Backup II

