

Deploying Cocoon for Operator Performance

A “Great Mines Think Alike” Production

Team



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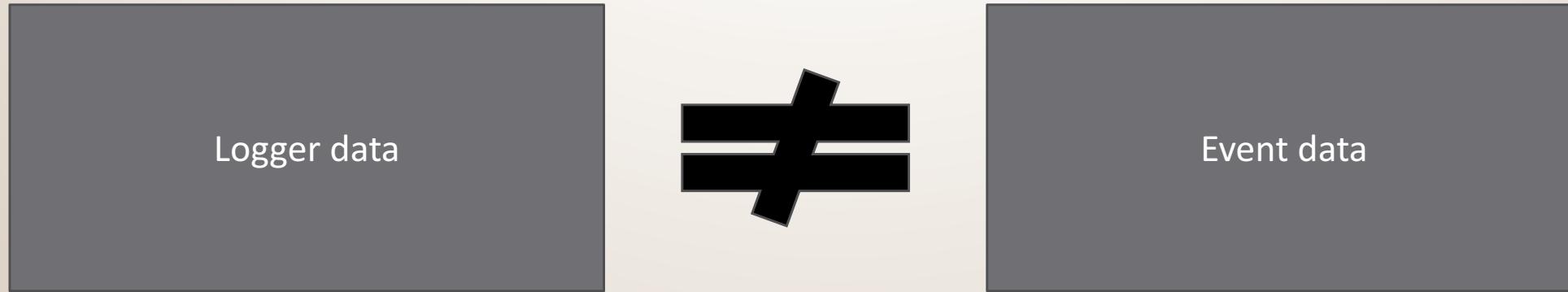
Azi Hussain

Challenge: Operator Performance for Caterpillar

- Equipment is expensive!
- Variance in operation → variance in outcome
- High turnover → can't develop drivers

Can we build a feedback system for operators to get them to expert skill level very quickly?

Data problems



**So how can we merge logger data
with event data to predict events in
advance of them actually happening?**

Innovative data processing

**Semi-automated process to align
timestamps in logger data and event data.**

**Result: we found events with timestamps
that lined up with logger data!**

The Model

- Time series model focusing on torque oil temperature
- Predicts future temperature based on current and recent temperature
- In upcoming demo, event is predicted 30 seconds before it actually happened

Cocoon demo time!

Next steps for Cocoon

- Manager view and integrate incentives
- Different models for different events
- Aspirational system: artificial neural net models that update incrementally
- Better data collection: integrating logger data and events

Questions?

The Aspirational Model

- Artificial neural net, trained once
- “Online” model: feed outcomes back into it to update it incrementally
- Can build on top of current system

Data processing steps

Step	Can we do it?
When was logger data pulled?	Yes
Was there an event within the last hour of the data being pulled?	Yes
If yes, can we manually look at logger data to align with the event time?	Yes

Result: we found events that lined up with logger data.

Data processing screenshots

```
In [730]: session_events_dict[17][['MACH_SER_NO', 'SCND_INFO_TYP', 'timestamp']]
```

```
Out[730]:
```

	MACH_SER_NO	SCND_INFO_TYP	timestamp
4310	Truck 1	Torque Converter Oil Temperature High	2016-07-29 17:22:32

```
202 11779,2016-07-29 17:21:25,107
203 11780,2016-07-29 17:21:30,108.6666641
204 11781,2016-07-29 17:21:35,110.3333359
205 11782,2016-07-29 17:21:40,111.5
206 11783,2016-07-29 17:21:45,112.3333359
207 11784,2016-07-29 17:21:50,113.1666641
208 11785,2016-07-29 17:21:55,114
209 11786,2016-07-29 17:22:00,114.8333359
210 11787,2016-07-29 17:22:05,115
211 11788,2016-07-29 17:22:10,115
212 11789,2016-07-29 17:22:15,115
213 11790,2016-07-29 17:22:20,115
214 11791,2016-07-29 17:22:25,115
215 11792,2016-07-29 17:22:30,115
216 11793,2016-07-29 17:22:35,115
217 11794,2016-07-29 17:22:40,115
218 11795,2016-07-29 17:22:45,115
219 11796,2016-07-29 17:22:50,115
220 11797,2016-07-29 17:22:55,115
221 11798,2016-07-29 17:23:00,112.5384598
222 11799,2016-07-29 17:23:05,109.4615402
223 11800,2016-07-29 17:23:10,106.875
224 11801,2016-07-29 17:23:15,106.25
225 11802,2016-07-29 17:23:20,105.625
226 11803,2016-07-29 17:23:25,105
```