



Big Data for smart Pavement Management

LIRA Annual Seminar

Presented by Dirk Jansen

2020/12/9

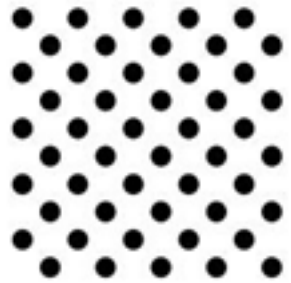


„Big Data is everything which cannot be handled by Excel ...“



Big Data is Data ...

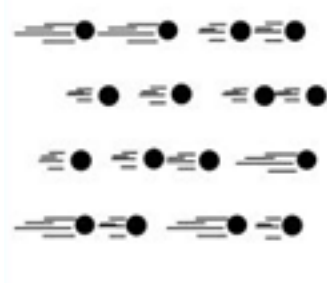
...at Rest



Terrabytes to exabytes of
existing data to process

VOLUME

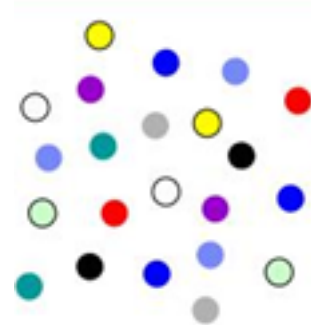
...in Motion



Streaming data,
milliseconds to seconds to
respond

VELOCITY

...in many Forms



Structured, unstructured,
text, multimedia

VARIETY

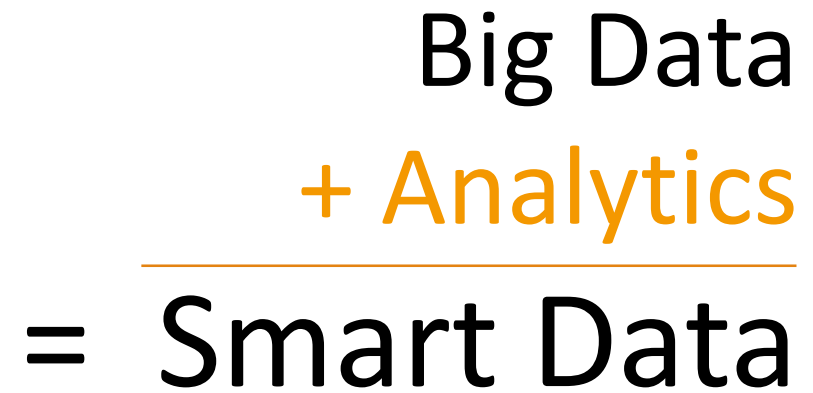
...in Doubt



Uncertainty due to data
inconsistency &
incompleteness,
ambiguities, latency,
deception, model
approximations

VERACITY

Big Data = f *(road condition data, vehicle data, climate impact, traffic flow data, floating car data, social media data, IoT data, smartphone data, etc.)*





Scope



Screening the whole
processing chain of turning big
data into information to
achieve improvements in asset
management

pilot application
'condition based pavement management'



Organization

BD-Pave initiative is organized in technical and administrative work packages.

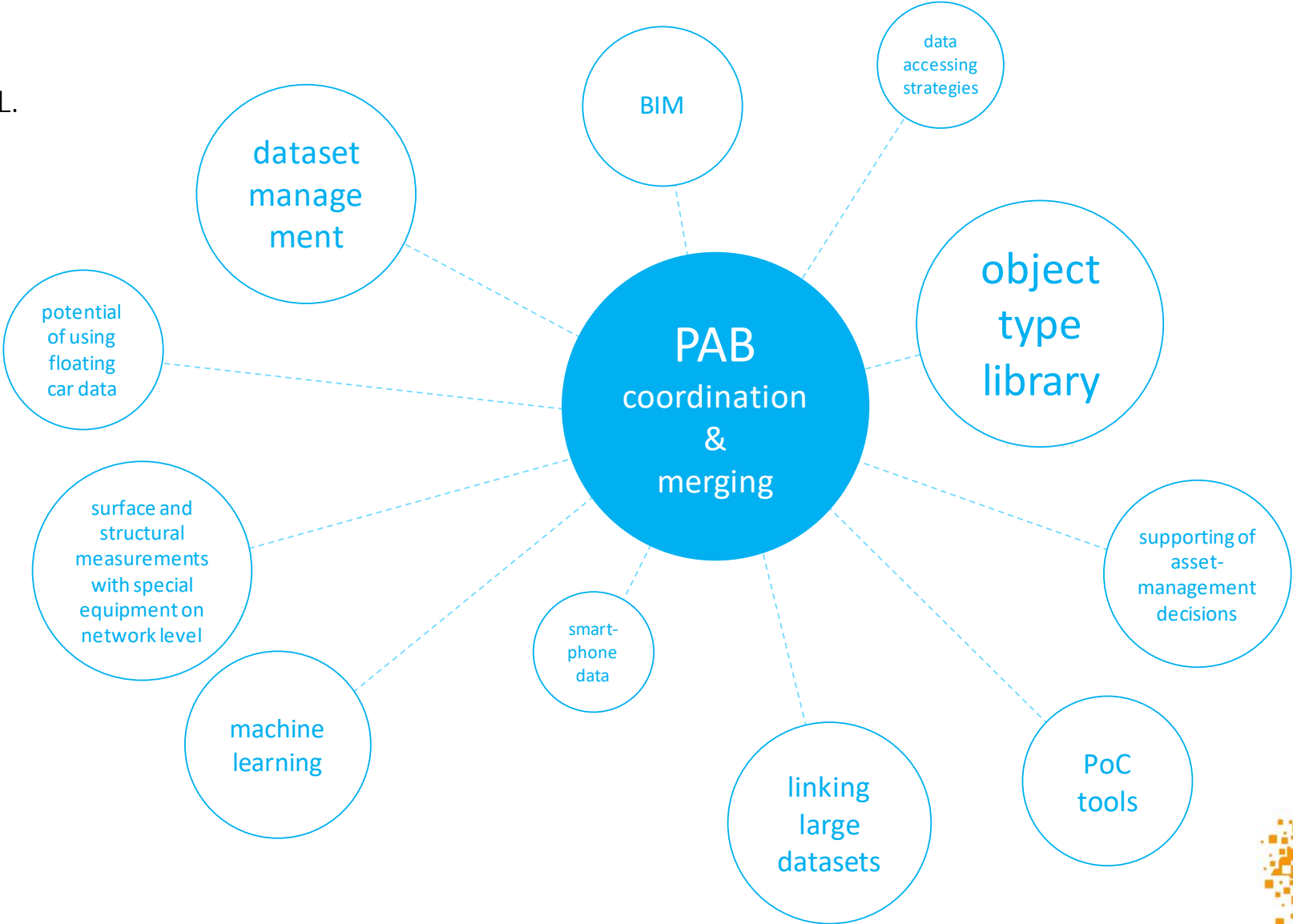




Organization

Several supporting projects are completed or ongoing within FEHRL.

These form a good basis to start.





Status

- 2017 - 2018

drafting a project description for a self-funded project on the use of Big Data

- 2019

launch of the BD-Pave initiative

administrative setup

launch of website

start of WP1

first workshop

- 2020

start of further WPs

installation of PAB





Status



WP 1 – Best Practice

Key questions

- What kind of data is existing?
- How is this data organized and accessible?
- What is missing for pavement management?
- What are the expectations to Big Data technologies?

What kind of data is existing?

Current condition data used for pavement management

- 100 parameters have been identified
- Survey amongst 13 European countries
 - Data in use
 - Data wanted
 - Data available



WP 1 – Best Practice

Results (condensed summary)



longitudinal evenness ¹⁾



Friction, bearing capacity, transvers evenness, cracking and surface defects



Noise indicators and air pollution indicators

Wanted and needs

in context of pavement management

- external parameters
(road markings, signs, surroundings, weather, etc.)
- condition parameters relevant for autonomous driving
- adaptation of parameters to climate change

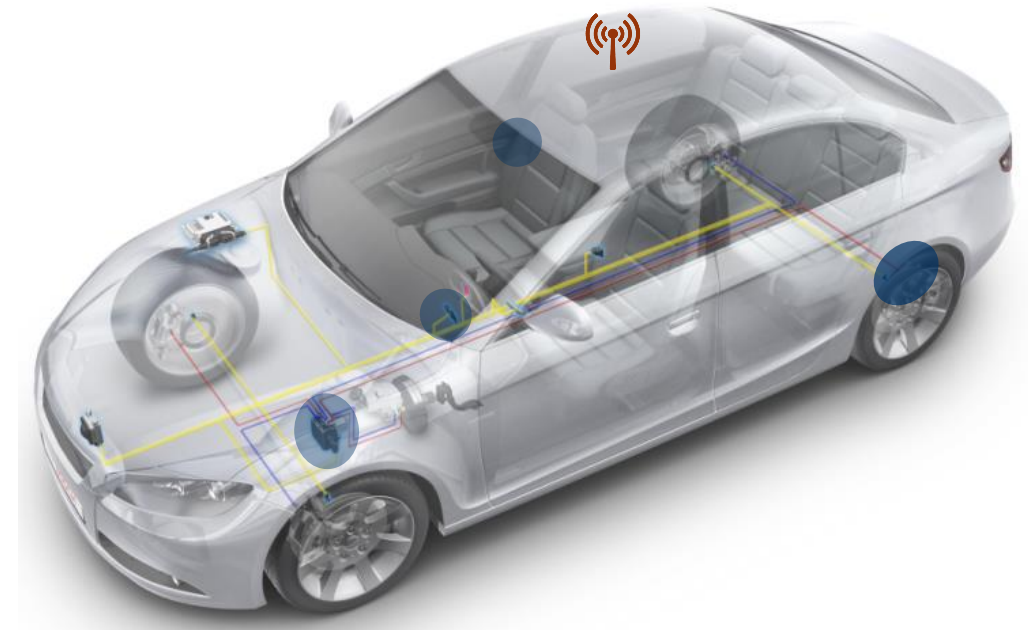


WP 2 – Datasets (new data sources)

Key questions and challenges

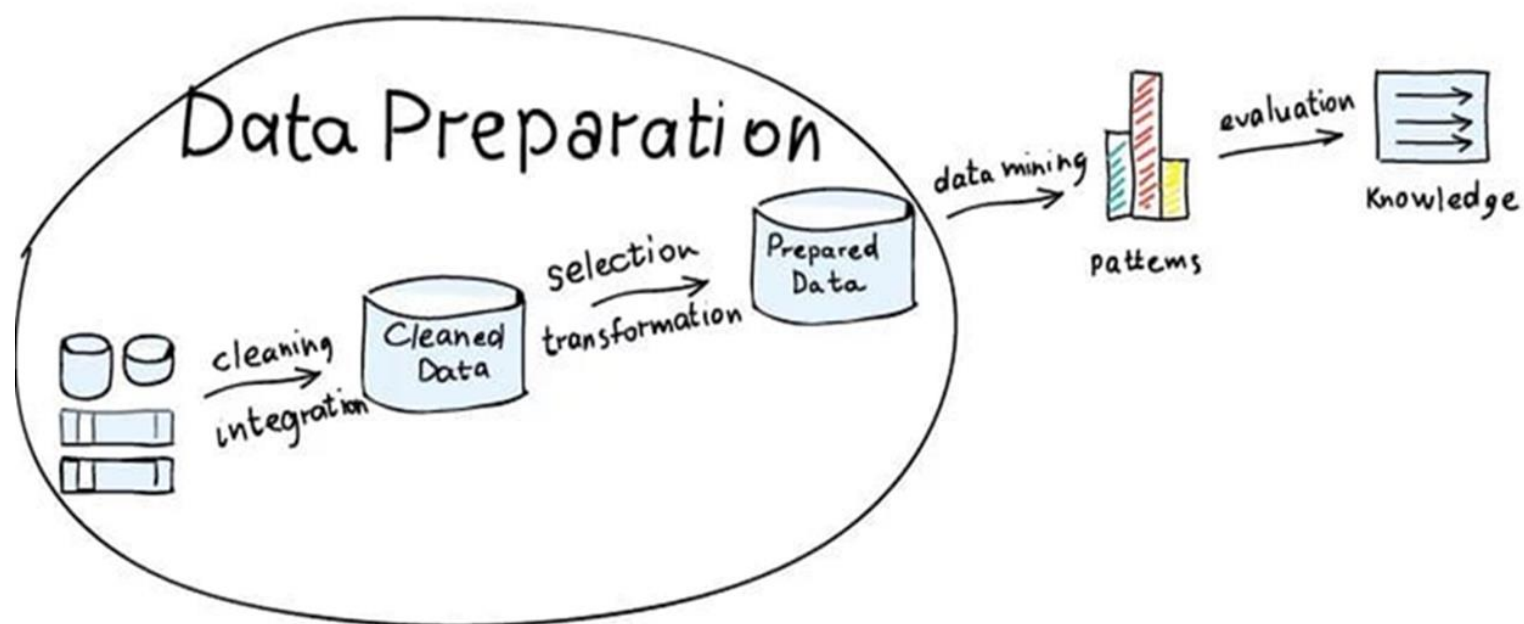
(first thoughts & under discussion!)

- Data availability
- Data resolution
- Data transfer
- Data precision and quality
- Data format

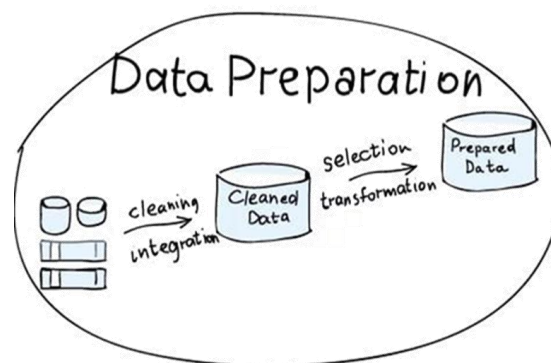


- Revolution counter DF
- Acceleration sensor a_{xyz}
- Rotation rate sensor $DRS \Omega_{xyz}$
- Inertial sensor $MM7$
- Steering angle sensor LWS
- Airbag-ECU
- Camera
- Radar
- Lidar
- Ultrasound USS
- ...

WP 5 – Usage of data (*“the big data work package”*)

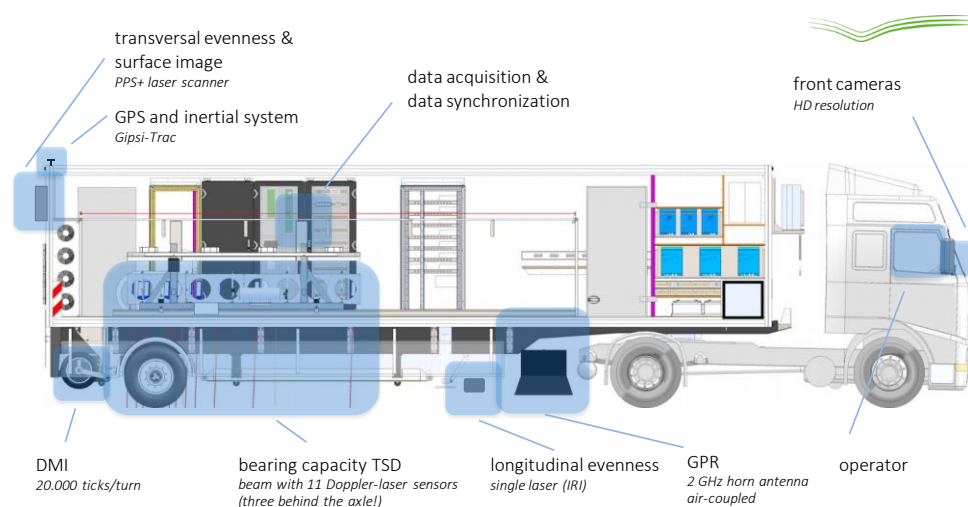


WP 5 – Usage of data (“the big data work package”)



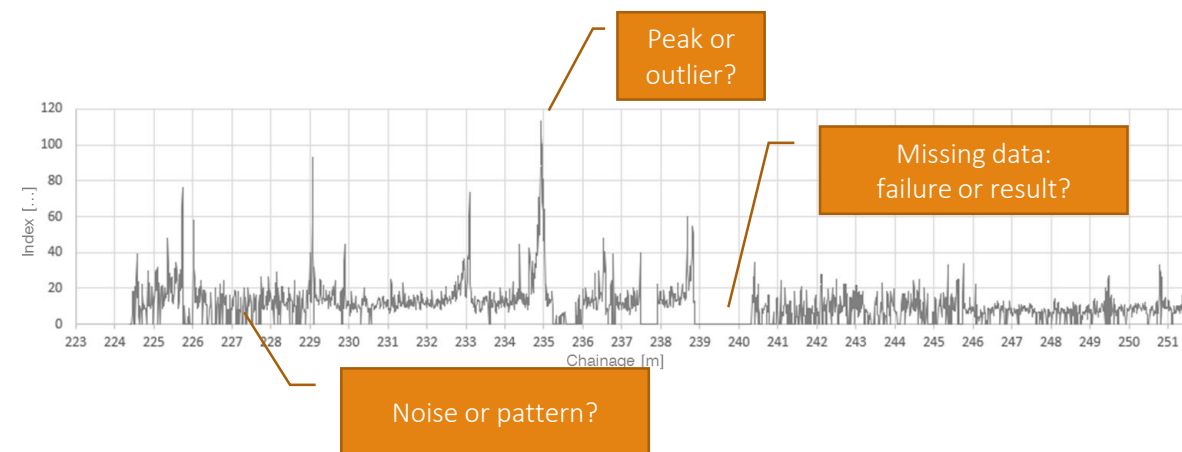
Pilot application

BAST-MESAS: Road condition data at traffic speed



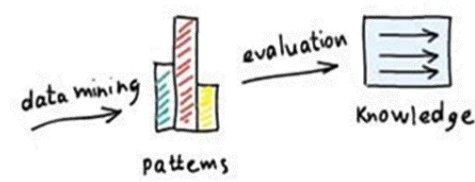
Data cleansing

Clarification and identification



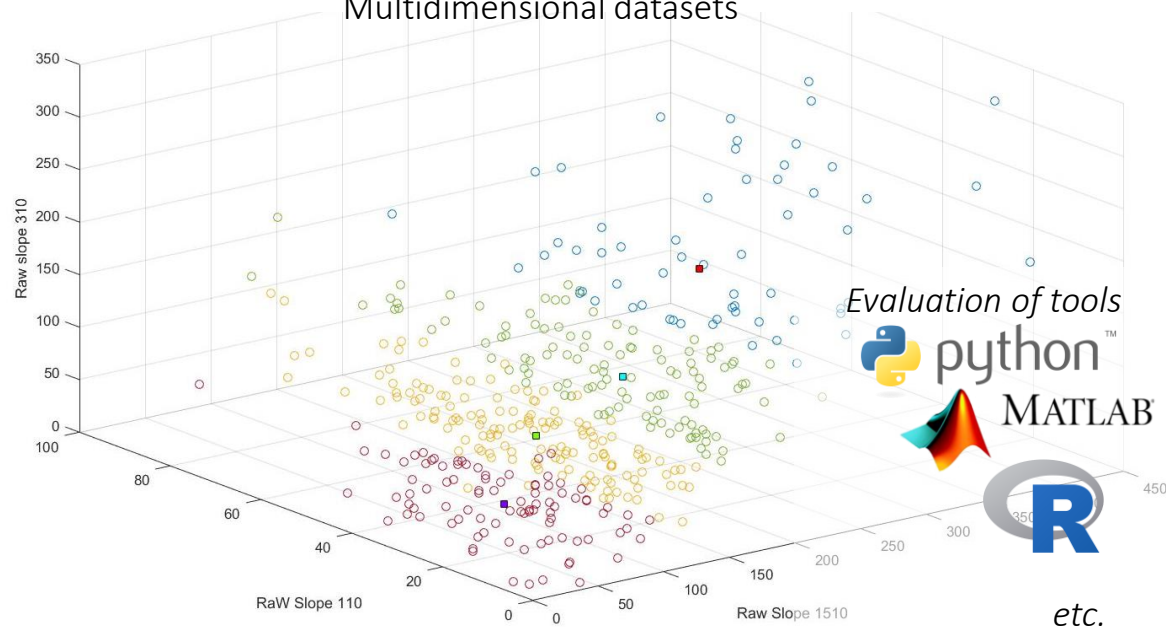


WP 5 – Usage of data (“the big data work package”)



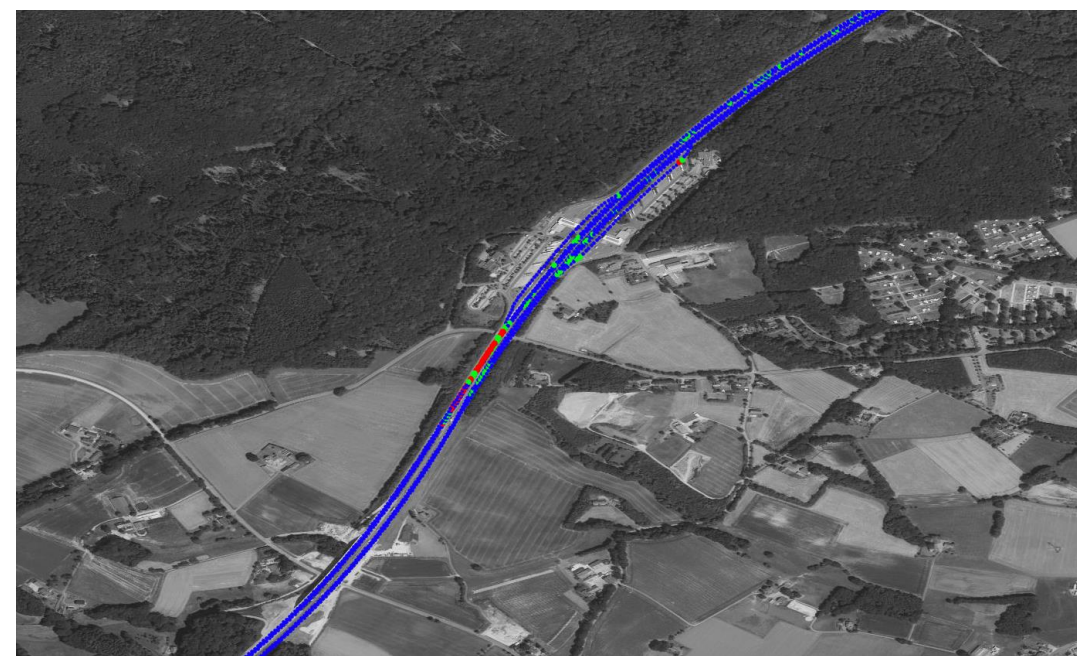
Patterns

Supervised and unsupervised methods
Multidimensional datasets



Evaluation and knowledge

Blending of data driven results and real world application



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