FUTURE OF MACHINE LEARNING

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Future of Machine Learning

Diez-Olivan et al. (2019) define prognostic approaches in Industry 4.0 as tools for predicting and providing insights into abnormal behaviour within monitored processes. The authors categorise prognostic models in Industry 4.0 into three types: descriptive, predictive, and prescriptive. Table 1 synthesises these models for comparative purposes.

TABLE 1 | Prognostic types

Prognostic type	Classification	Aim	Method	Application
Descriptive	Pattern recognition, health management	Summarise, Identify patterns (no root cause assumption)	Unsupervised Machine learning (ML), (clustering, outlier detection)	Fault detection, event recognition, health status
Predictive	Condition- and predictive-based maintenance	Anticipate faults, Assess severity	Supervised ML, (e.g. ANN, SVM, RNN)	Predictive maintenance, fault prediction Remaining Useful Life (RUL) estimation
Prescriptive	Production scheduling, life-cycle optimisation, supply chain management and logistics	Recommend optimal fault prevention / mitigation.	Optimisation algorithms, fuzzy logic, evolutionary solvers	Maintenance scheduling, production optimisation, life-cycle management

The assignment requires selecting one prognostic type, provide a rationale, and describing its impact on a chosen sector. While the paper does not discuss media and entertainment, live broadcast—especially for live news and sports—is a relevant field requiring robust delivery.

In live broadcast infrastructure, descriptive prognosis could monitor equipment health of a broadcast centre, predictive prognosis could forecast end-of-life for critical equipment like cameras and servers, and prescriptive prognosis would handle disaster recovery in the event of a failure.

The 2021 outage at the Red Bee Media broadcast centre highlights the consequences of ineffective prognosis. Triggered by a fire alarm which incorrectly identified a fire, the release of fire-suppressant gas removed oxygen leading to a sonic wave which destroyed the hard drives (BBC News, 2021; Ofcom, 2022). Furthermore, the subtitling emergency back-up failed leaving Channel 4's subtitling offline for almost three months. This Ofcom regulatory breach meant accessibility needs were not met for viewers.

In this case, it appears all prognosis models likely failed. Descriptive systems may have failed to accurately recognise patterns in the fire detection system. Predictive models may have failed to flag the fire sensor was nearing end-of-life. Crucially, prescriptive disaster recovery systems also failed, taking broadcast services offline.

The most critical prognosis failure in this incident was prescriptive. Lack of effective disaster recovery resulted in loss of broadcast service, loss of accessibility, and regulatory breach. While fixing the descriptive and predictive models is essential, essential to repair, failure can occur for multiple reasons, and without an effective mitigation by disaster recovery broadcast services will go off air.

References

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