Article 1 : Improved Monitoring and Surveillance through Integration of Artificial Intelligence and Information Management Systems

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The paper describe a successful project aimed at enhancing dam safety management by integrating artificial intelligence (AI) concepts and technologies into an existing information system (IS). This vastly improved the system capacity by providing new functions : MISTRAL and DAMSAFE, were developed and integrated into the IS.The integration of AI elements was facilitated through specific technologies developments. MISTRAL has been active and working since 1992, whereas DAMSAFE is integrated with the pre-exsiting MIDAS system. The project involve inter disciplinary collaboration and significant development effort in order to perfectly achieve the main goals.

Firstly, MISTRAL, linked to the monitoring system, provides real-time interpretation and an explanation of the dam states using AI techniques such as numerical functions, production rules, and constraint-based techniques. Its mains functions are Data analysis, receive datas from instruments and analyze in real time. State identification, it identify the current state of the dam, potentially including normal, warning or critical conditions. Overall, it improve situational awareness potentially avoiding critical conditions, which is a massive upgrade from normal components we had before that.

DAMSAFE, on the other hand, is mainly focused on the safety assessment. In order to do that it integrates various types of information and models to support safety management procedures. It enables the representation and testing of dam system states against normative models. It offers a deeper understanding of dam safety. This then empower dam safety management to make proactive decisions and eliminate potential risks before they even show up.

AI, by providing real-time interpretation, integrating advanced reasoning and diverse informations can vastly improve dam safety management. And to do that, we saw that the two systems, MISTRAL and DAMSAFE, using AI technologies, are successful to achieve this kind of goals.

Overall, the paper shows the successful integration of AI in a real world engineering application. Tthe benefits of AI monitoring in dam safety management, including improved data interpretation, enhanced safety evaluations, reduced false alarms, increased efficiency, and ultimately, higher safety levels for dams. Additionally, it highlights the broader applicability of AI concepts and technologies beyond dam safety management to other structural and environmental monitoring applications. This paper could be seen as a Pioneering work that

paved to way into integrating AI into safety of dam potentially preventing large disaster that a human couldn’t do.

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