

FPNES: fuzzy Petri net based **expert system** for bridges damage assessment

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Abstract:

A framework of integrated **expert systems** based on fuzzy Petri net, called fuzzy Petri net based **expert system** (FPNES) are proposed for bridge damage assessment. Major features of FPNES include: reasoning for uncertain and imprecise information; knowledge representation through the use of hierarchical fuzzy Petri nets; reasoning mechanism based on fuzzy Petri nets; and explanation of reasoning process through the use of hierarchical fuzzy Petri nets. FPNES offer several important benefits: (1) providing reasoning mechanism for uncertain and fuzzy information, (2) improving the efficiency of rule based reasoning by constructing relationship of concurrency among rule activation, and (3) explaining how to reach conclusions through the movements of tokens in fuzzy Petri nets. An application to the damage assessment of the Da-Shi bridge in Taiwan is used as an illustrative example of FPNES.

Index Terms:

civil engineering computing; FPNES; fuzzy Petri net based **expert system**; bridge damage assessment; integrated **expert systems**; reasoning; imprecise information; knowledge representation; hierarchical fuzzy Petri nets; reasoning mechanism; explanation; reasoning process; uncertain information; rule based reasoning; rule activation; tokens; Da-Shi bridge; Taiwan