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Functorial semantics for Petri nets under the individual token philosophy

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Abstract

Although the algebraic semantics of place/transition Petri nets under the collective token philosophy has been fully explained in terms of (strictly) symmetric (strict) monoidal categories, the analogous construction under the individual token philosophy is not completely satisfactory because it lacks universality and also functoriality. We introduce the notion of pre-net to recover these aspects, obtaining a fully satisfactory categorical treatment centered on the notion of adjunction. This allows us to present a purely logical description of net behaviours under the individual token philosophy in terms of theories and theory morphisms in partial membership equational logic, yielding a complete match with the theory developed by the authors for the collective token view of nets.