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Algorithmic Verification of Channel Machines Using Small Models

Jonathan Sharyari

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Verification

- Verification is the process of evaluating software to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase[1]
- Model checking is the task of automatically verifying the correctness of a program, with regard to its specification.
- This is generally done through an exhaustive graph search

Channel Systems

- A channel system is a system that relies on channels for its operation, e.g. communication protocols
- If buffers are unbounded, the model checking of such protocols corresponds to searching an infinite graph an undecidable problem

Small Models

- One technique of overcoming this problem is to use small models
- For some types of problems, a small problem instance may exhibit all the relevant behavior of a larger system
- Using small models, undecidable verification problems can be made decidable

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Problem Formulation

- Combine the ideas of small models with that of a well-known verification technique abstract interpretation to be applicable on channel systems
- Implement the verification algorithm

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Remaining Work

- Complete the implementation
- Carry out case studies
- Carry out comparisons towards similar verification tools