

Model of a semiautomatic detection system

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The topic

- Difficult to choose (according to dissertation thesis)
- Chosen and surprisingly approved without any serious issues
- Real possibility to get benefit
- More or less practical topic

Goals

- Support application development
- Support code maintenance
- Provide graphical overview of the system
- Provide graphical representation for general better orientation in the given project

Brief system specification

- Layer based complex semiautomatic analyzing application of chips
 - General support in chip reversing process (especially with respect to chips physical structure)
 - Image processing
 - Vector / bitmap image editor
 - Semiautomatic interlayer analyzing tools

Semiautomatic analyzing tools

- Similar elements annotation / lookup
- Conductive lines detection
- Interlayer correlations / interconnections
- Colour based analyser
- Additional information database
- Edge detectors

Why Finite State Machine

- Simplicity of FSMs
- Widely used and well known
- Intuitive work
- Graphically sufficient (state chart)
- Convenient digital representation – see slide 18.
- Vs. Petri nets, FlowCharts, etc.

Actual work

- Bc. students
 - Conductive layers detection
 - Recognised elements annotation
- MSc. students
 - Recognised elements annotation & search the same/similar elements
 - Vector data layers

FSM basis

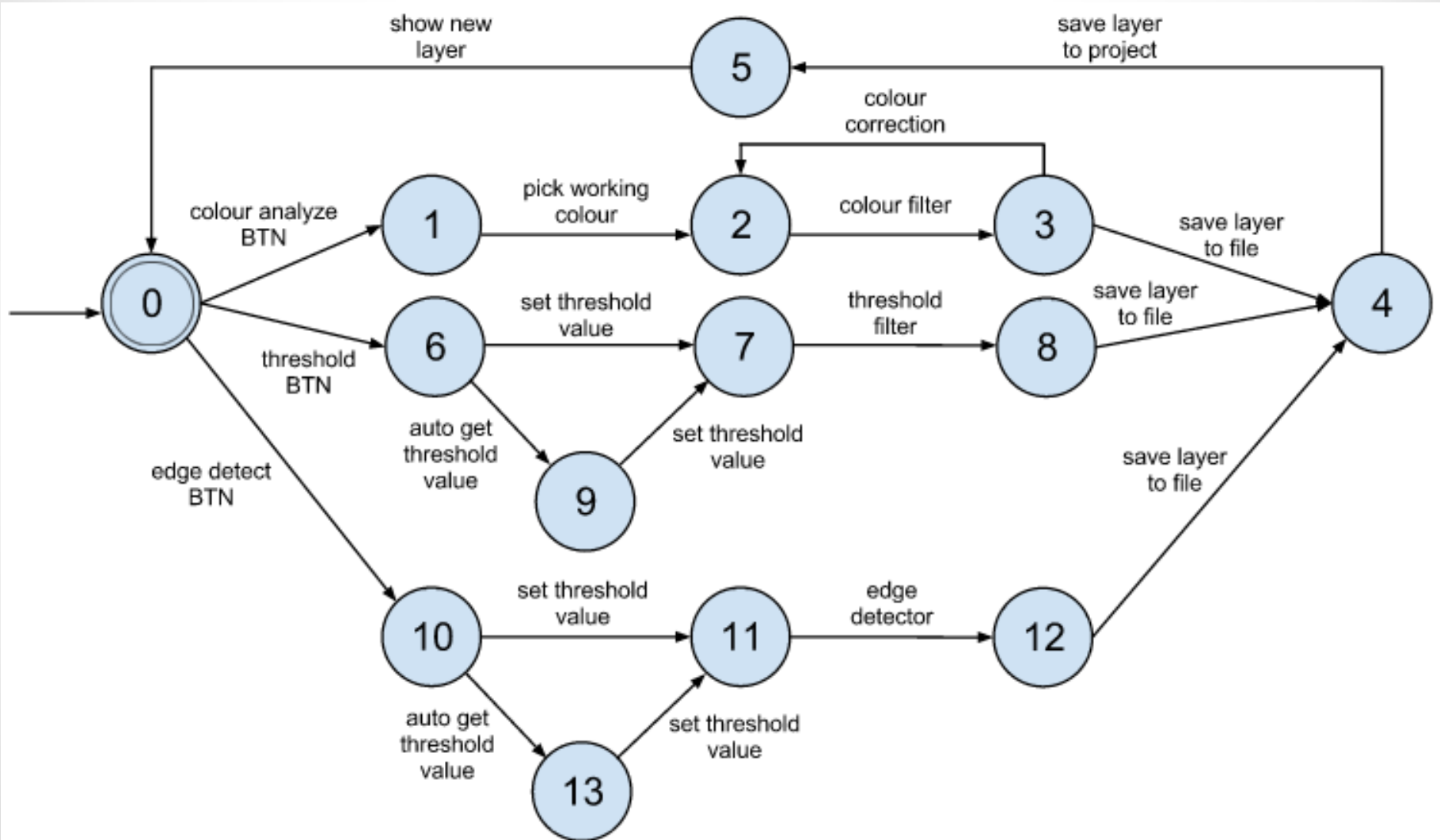
- FSM $\mathbf{M} = (\mathbf{Q}, \mathbf{E}, \mathbf{d}, \mathbf{q}_0, \mathbf{F})$
- \mathbf{Q} – finite set of states
- \mathbf{E} – alphabet, finite set of symbols
- \mathbf{q}_0 – starting state
- \mathbf{F} – finite set of final states; \mathbf{F} is subset of set \mathbf{Q}
- $\mathbf{d}: \mathbf{Q} \times \mathbf{E} \rightarrow \mathbf{Q}$... deterministic & non-deterministic

Simple model

current status

- Basic functions
 - Thresholding (background filter)
 - Edge analyse
 - Colour analyse
- Basic FSM model
 - Designated for enhancement
 - No layer processing features
 - No advanced functions (semiautomatic detection tools)

Current status

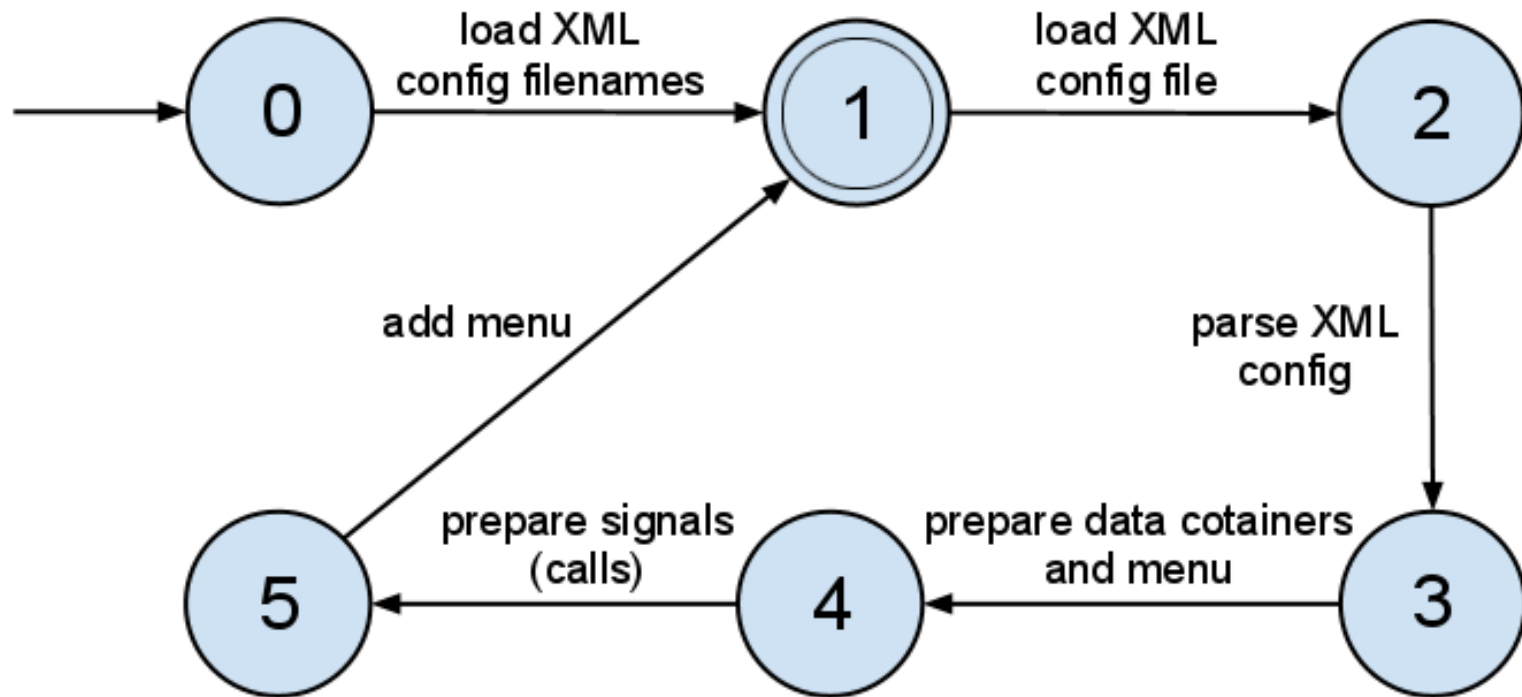


Simple submodels

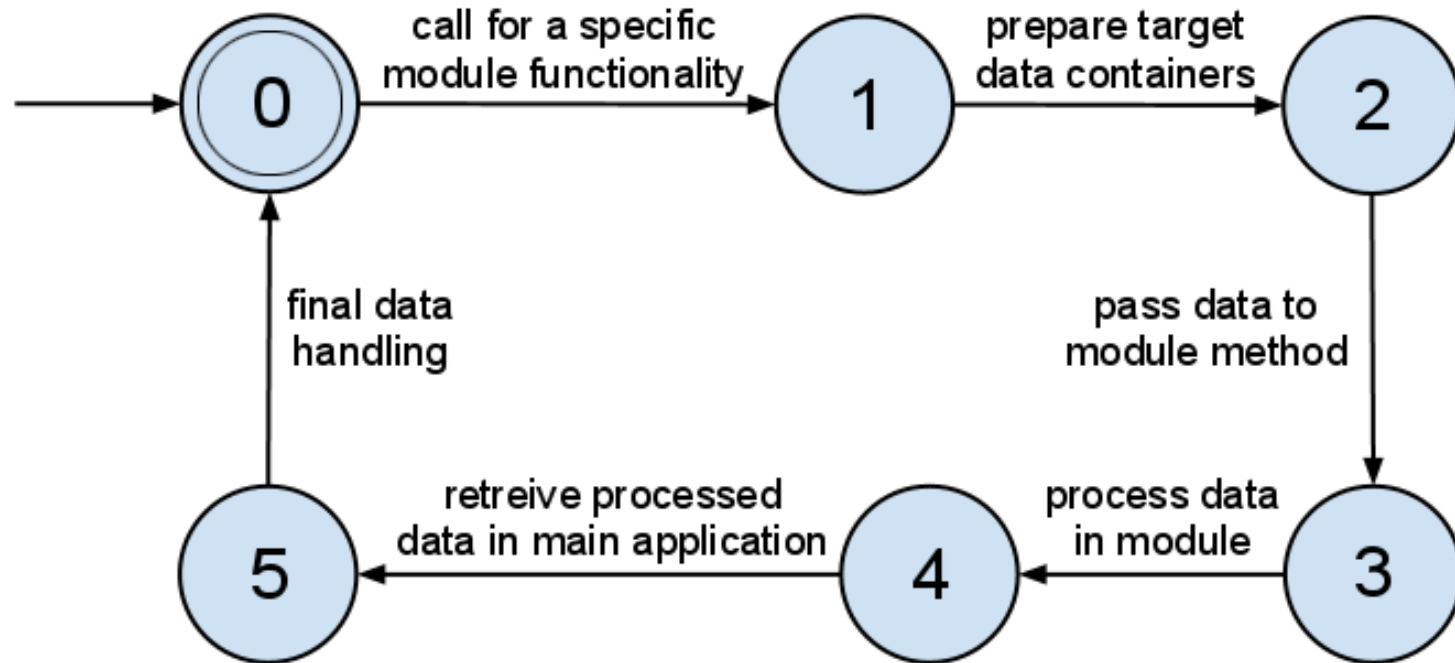
planned status

- Module(s) connection
- Module call
- Elements annotation
- Auto-detection of conductive lines
- Similar elements recognition/search
- Interconnection mapping

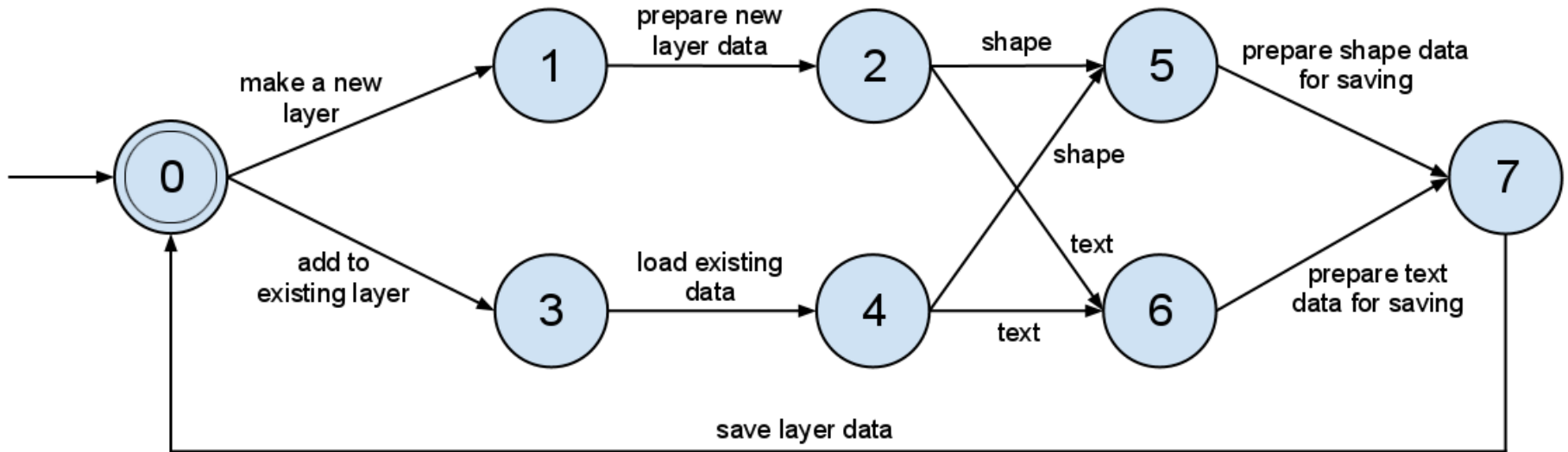
Modules connection



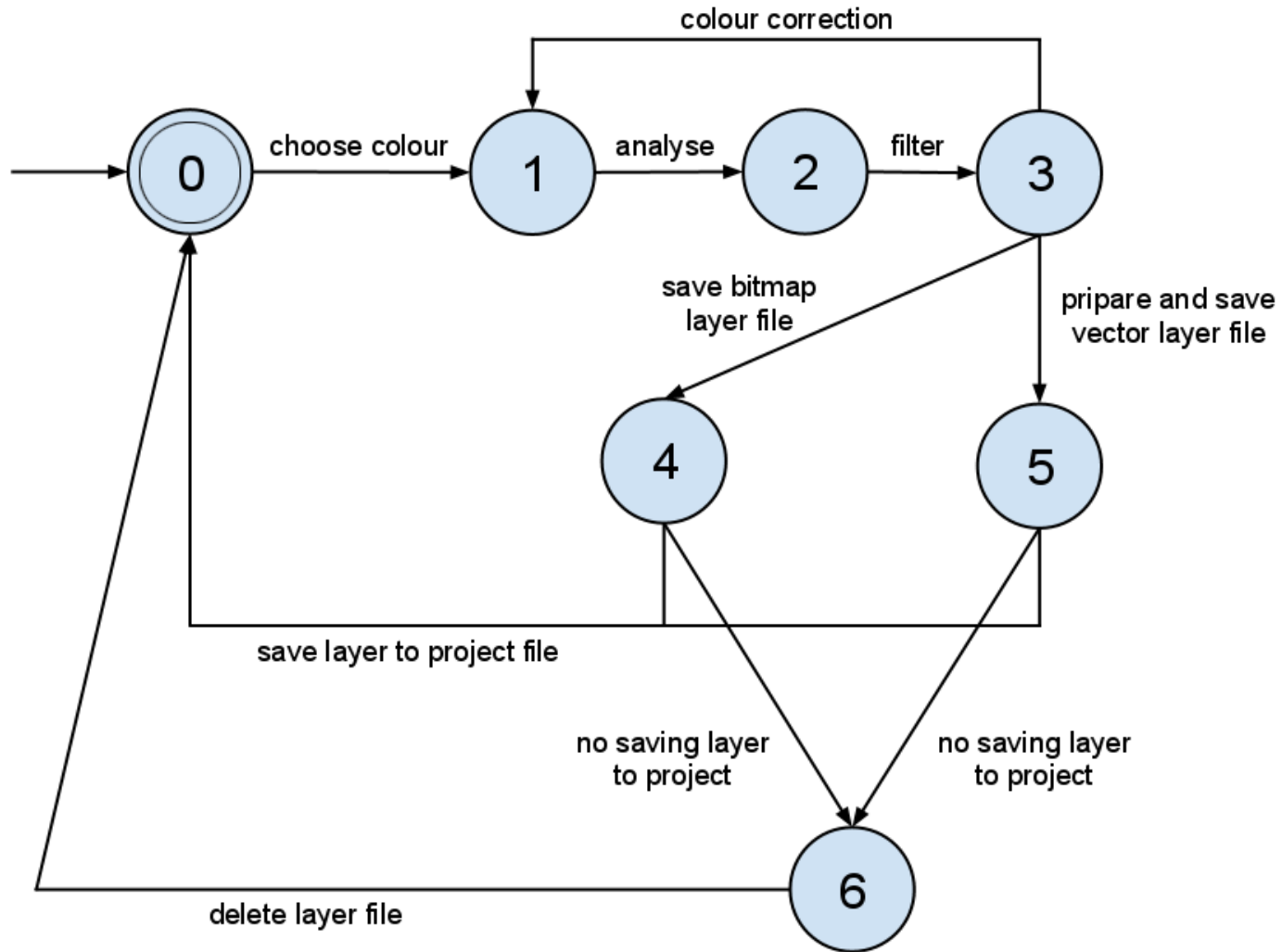
Module call



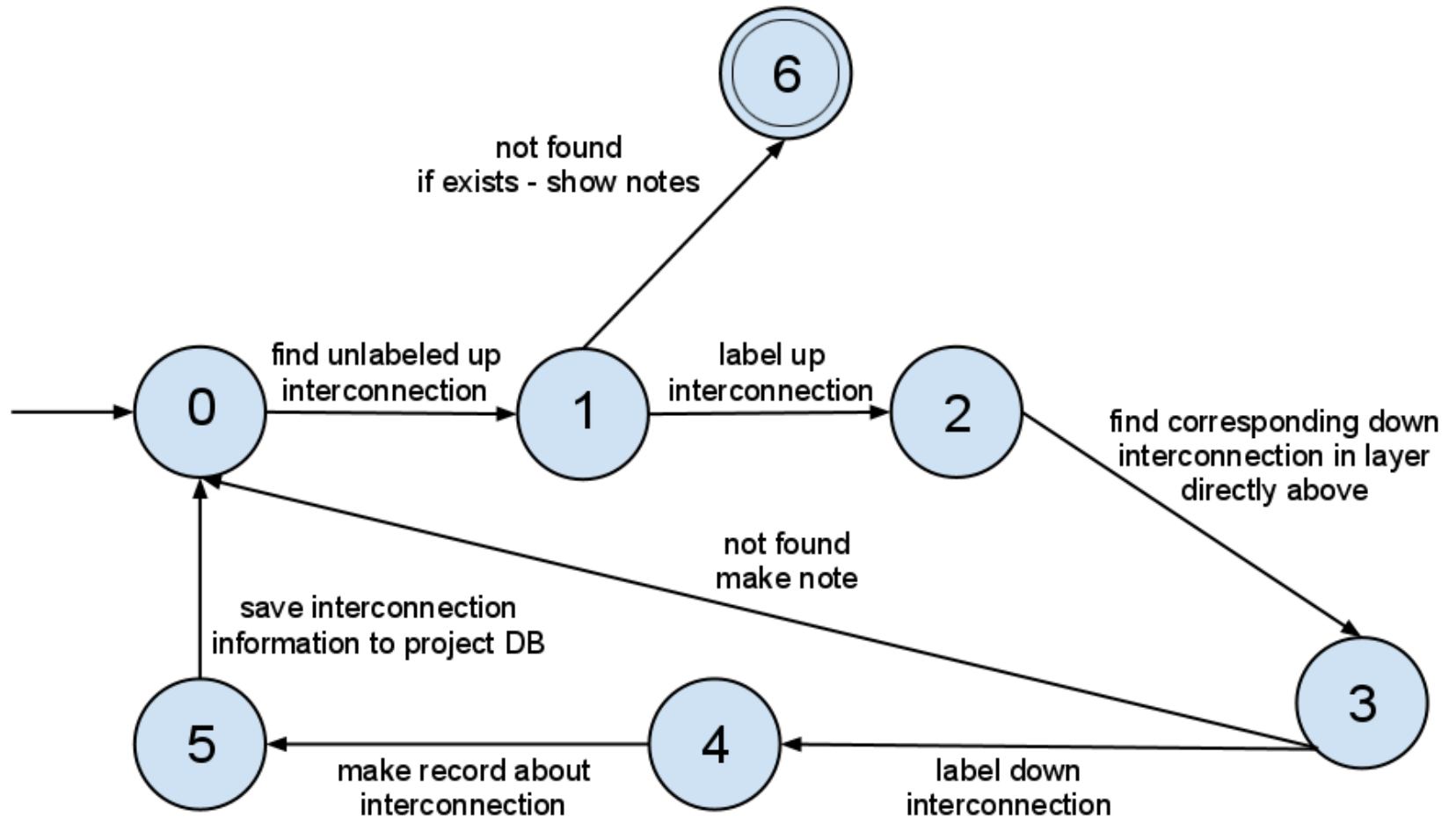
Elements annotation



Auto-detection of conductive lines



Interconnection mapping



Similar elements recognition

Enough time? See blackboard.

FSM in XML

```
<?xml version="1.0" encoding="UTF-8" ?>  
  
<machine name="TID-demo" initStateID="s1">  
  <states>  
    <state id="s1" label="A" />  
    <state id="s2" label="B" final="true" />  
  </states>  
  <transitions>  
    <transition from="s1" to="s2" id="t12" label="Funct A" />  
    <transition from="s2" to="s1" id="t21" label="Funct B" />  
  </transitions>  
</machine>
```

Thank you for attention