

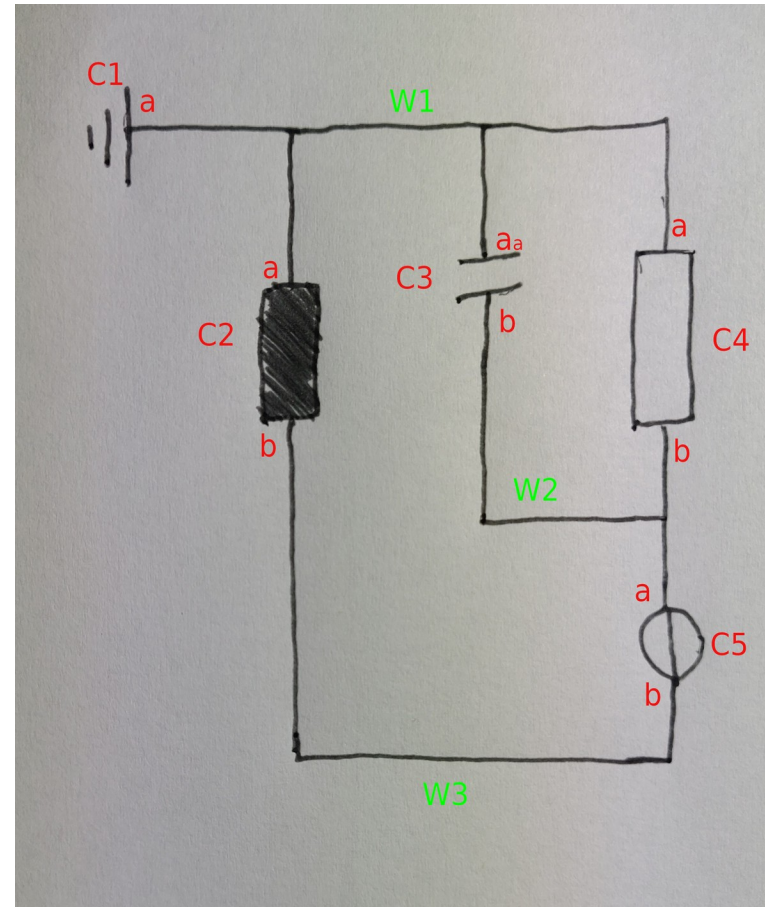
Metric Ideas

Other Papers

- All used some sort of Object detection metric for components
- Yolo Paper:
 - No distinction between annotation and ECCs
 - Distinct accuracy for:
 - ECCs and annotations
 - Detected lines
 - Junctions and Ts
 - Overall system performance measure:
 - Sum of above errors (seems weird or?)
 - $\text{Error}(\text{ECCS and annotations}) + \text{Error}(\text{Detected lines}) + \text{Error}(\text{Junctions and Ts})$
 - Where $\text{Error} = 1 - \text{Accuracy}$

Definitions

- components = {C1, C2, C3, C4, C5}
- wire_segments = {W1, W2, W3}
- (ignore a, b stuff)
- Topology defined as:
W1: C1, C2, C3, C4
W2: C3, C4, C5
W3: C2, C5



Component Metrics

- Components
 - Electrical Circuit Components (ECC) (e.g. Resistor)
 - Any Object Detection Metric
 - Annotations
 - Macro: Annotation as a whole (e.g. 50mH)
 - Micro: Charwise (same as ECC metric)

Annotation Mapping

Does detected Annotation “A0” belong to ECC “E0”?

- How good are annotations mapped against their ECC?
- Examples:
 - A0 mapped against E0: TP
 - A0 mapped against E1: FP
 - Completely missing annotation => E0 is missing A0 due to A0 undetected
=> FN? Error transitions from component recognition
 - PROBLEM: Completely missing component? => will probably result in FP if there is another component without annotation. Or worse if there is no component then dunno what this is. It is not a FN because the annotation should be there.

Topology Metrics: Macro

- Error in any part of the topology results in a topology error

Topology Metrics: Micro

Ground Truth:

W1: C1, C2, C3, C4

W2: C3, C4, C5

W3: C2, C5

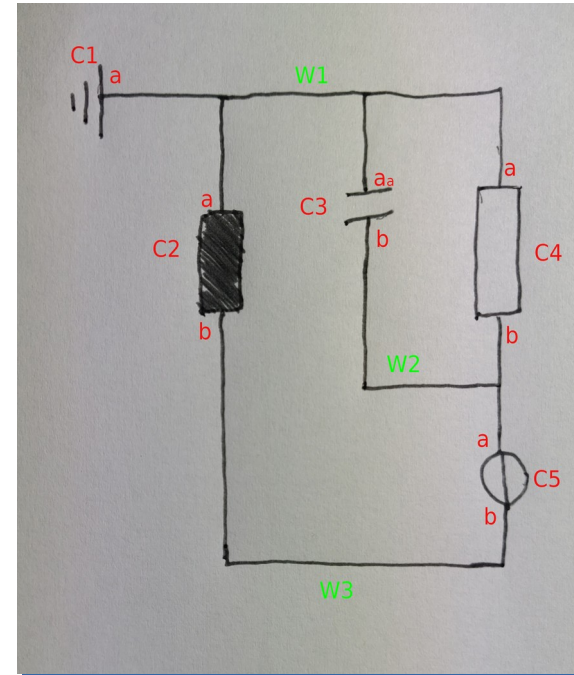
Prediction:

W1: C1, C2, C3 // 1 missing

W2: C3, C4, C5 // correct

W3: C2, C5 // correct

=> 66% correct



Topology Metrics: Micro

Ground Truth:

W1: C1, C2, C3, C4

W2: C3, C4, C5

W3: C2, C5

Prediction:

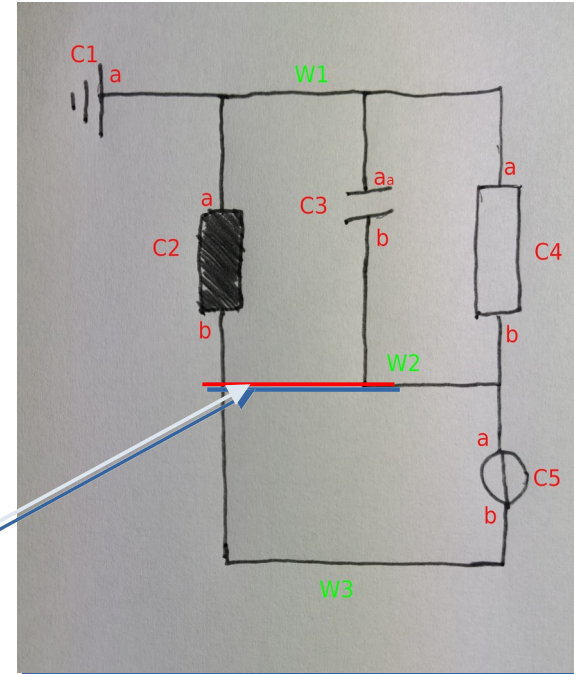
W1: C1, C2, C3, C4 // correct

W2: C3, C4, C5, C2 // 1 More

// W2 merges with W3 => short circuit C5

// that can't be modeled right now dunno what to do in such

// a case



Topology Metrics: Nano

Ground Truth:

W1: C1, C2, C3, C4

W2: C3, C4, C5

W3: C2, C5

Prediction:

W1: C1, C2, C3 // 1 missing

W2: C3, C4, C5 // correct

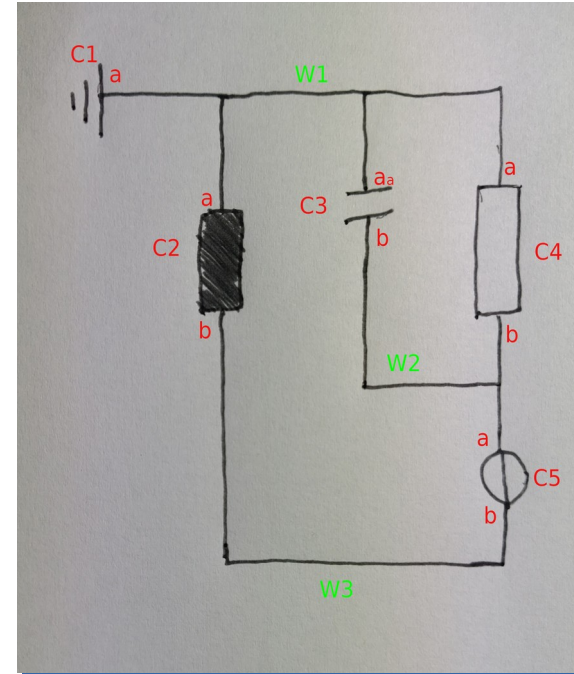
W3: C2, C5 // correct

Overall possible predictions = $\text{SUM}(\text{COUNT_COMPONENTS}(w) \text{ for } w \text{ in WIRE_SEGMENTS})$

= C1, C2, C3, C3, C4, C5, C2, C5 = N = 7

=> 6 Correct / 7 Overall

Generally it is possible to count here TPs and FPs



Overall

- Generally look at how much circuits were converted 100% correctly
- Treat every possible classification per circuit individually
 - Question how to treat transient errors
 - Include / Ignore
 - Include them would be simpler