Meeting 3 october

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1 Notes on kusters

Part I
The red algo

2 No seperating 4-cycle

FiXme: shouldnt we use a more general aproach, instead of a casebased one? i.e. if we do this kind of moves in the end it will be alrigth

2.1 Approach

1. Eliminate non-distinct corners. (This can be done without creating bad stuff)
2. Determine a cut between vertices with distance 1 to N and distance 2 to N using the algorithm from Yeap and Sarrafzadeh [1]
3. Prepare for this cut by first completing different valid paths. This without creating a blue Z.
   (a) Consider which is shorter, the shortest maximal chord or the shortest point of non-simpleness.
   (b) Remove this complication (see next two chapters).
4. Add the lower boundary of C as a valid path

2.2 Handeling chords

Explain how to color the cutouts

2.3 Handling non-simpleness

Suppose that the lower boundary walk is non simple. But has no chords (since the previous step removed all chords.

FiXme: what happens to a chord that starts before a non-simple point and ends after it?

2.4 Complete algo

See Figure 5

2.5 Difficulties

- Where two layers meet a blue Z can still form.

3 Separating 4 cycles

Encapsulating a 4-cycle If we can color the edges around a 4-cycle in a certain way we can handle the 4-cycle seperate from the rest of the graph. We call this *encapsulating* a 4-cycle.

If we can correctly comeatlor the interior I of the encapsulated separating 4-cycle (with the obvious corner assignment) $(1-\infty)$-pseudo one sided then the encapsulated can also be colored in $(1-\infty)$ manner.

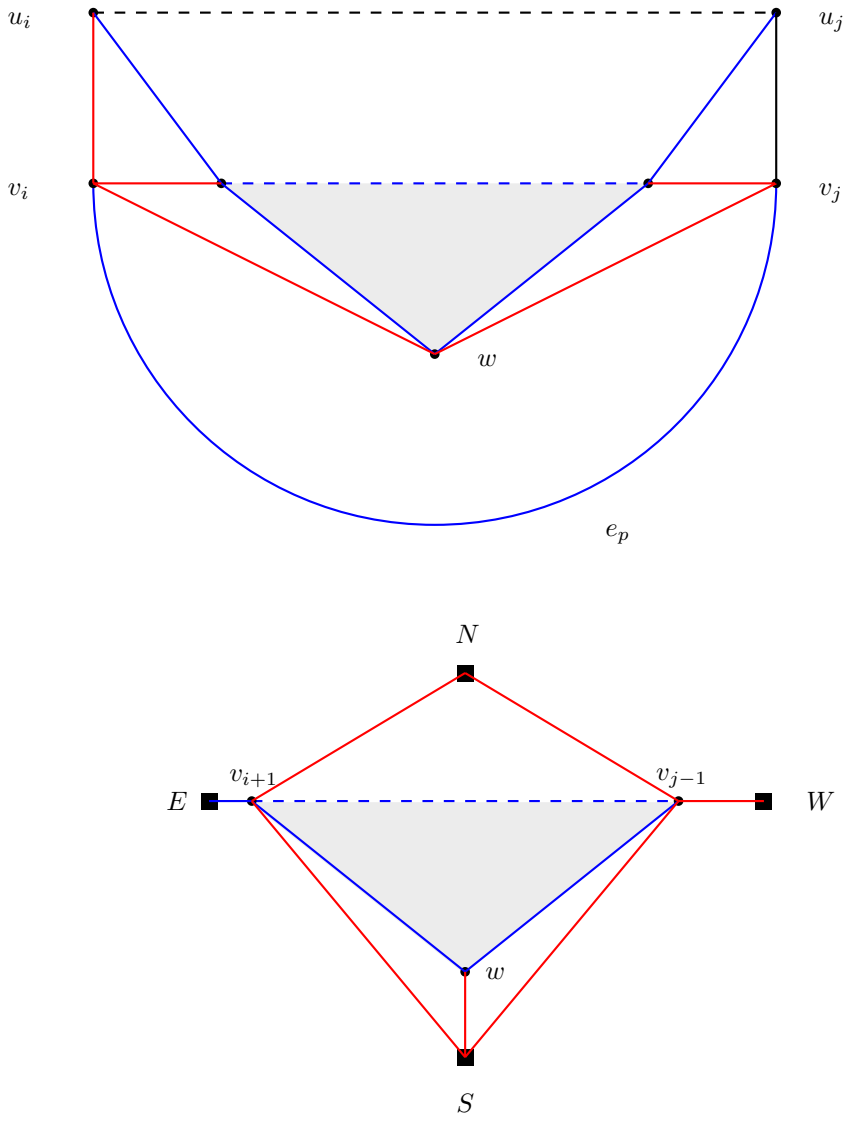


Figure 1: The standard case for a chord

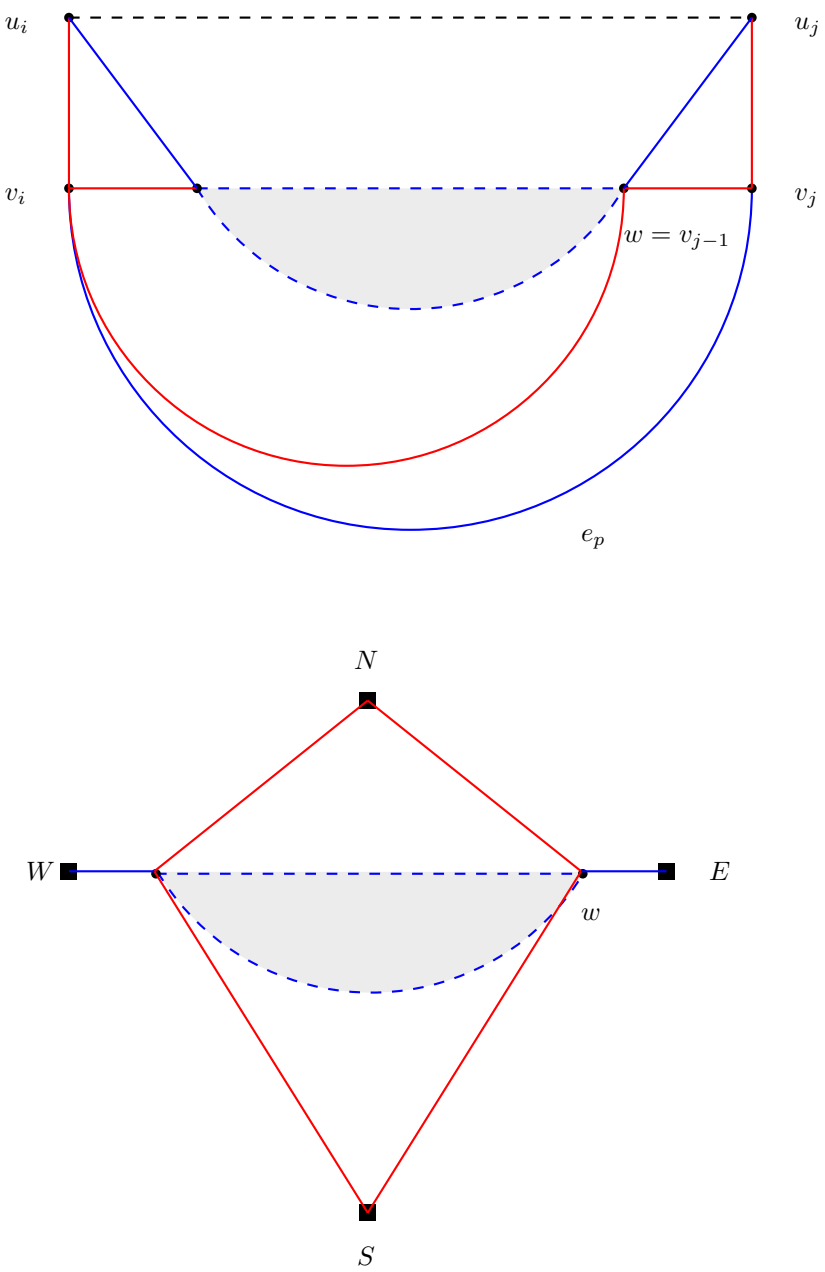


Figure 2: A case where the interior vertex of the chord w is one of the v

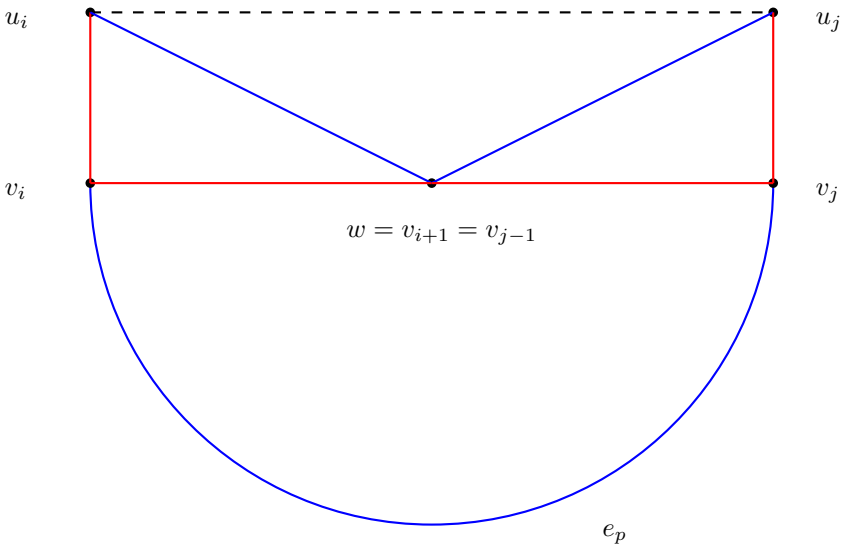
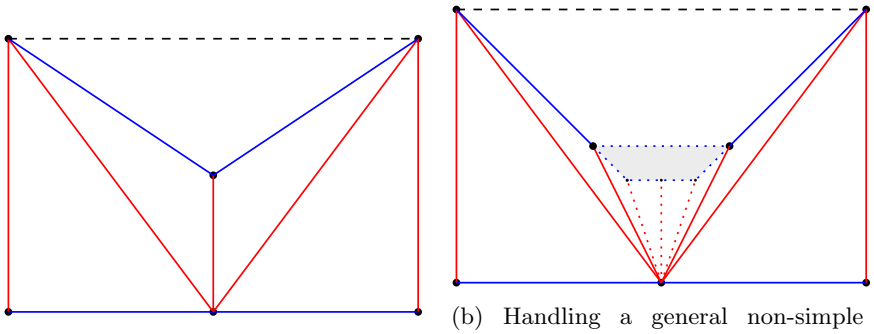


Figure 3: The case where the interior vertex of the chord w is one of the v from both direction. In this case the chord only skips one vertex.



(a) Handling a trivial non-simple point

(b) Handling a general non-simple point

Figure 4: Handling non-simple points

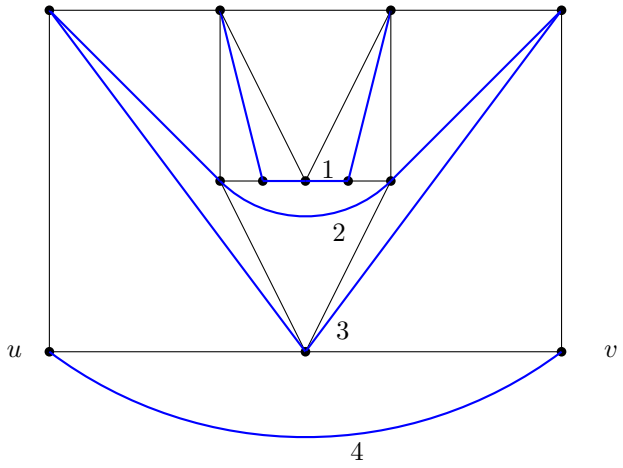


Figure 5: An example of a full round of the algorithm. In 1 a small chord is handled. Then 2 handles the point of non-simpleness of the walk and 3 handles the chord uv. 4 indicates the final valid path.

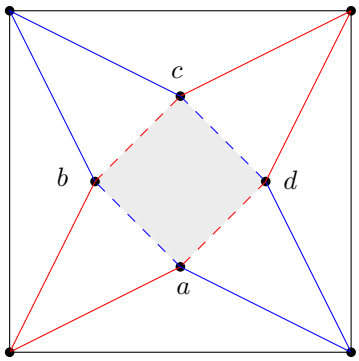


Figure 6: A general seperating 4-cycle. When there are no interior edges the vertices a, b, c, d collapse to one vertex and we end up with a *pyramid*. Partial colapsing can also occur.

3.1 Example

See Figure 8

3.2 Difficulties

- encapsulating 4-cylces generates new 4-cycles
- Not all colorings of the encapsulated graph yield a valid coloring of the regular graph
- Multiple 4-cycles next to each other. Collapsing one will create a separating triangle

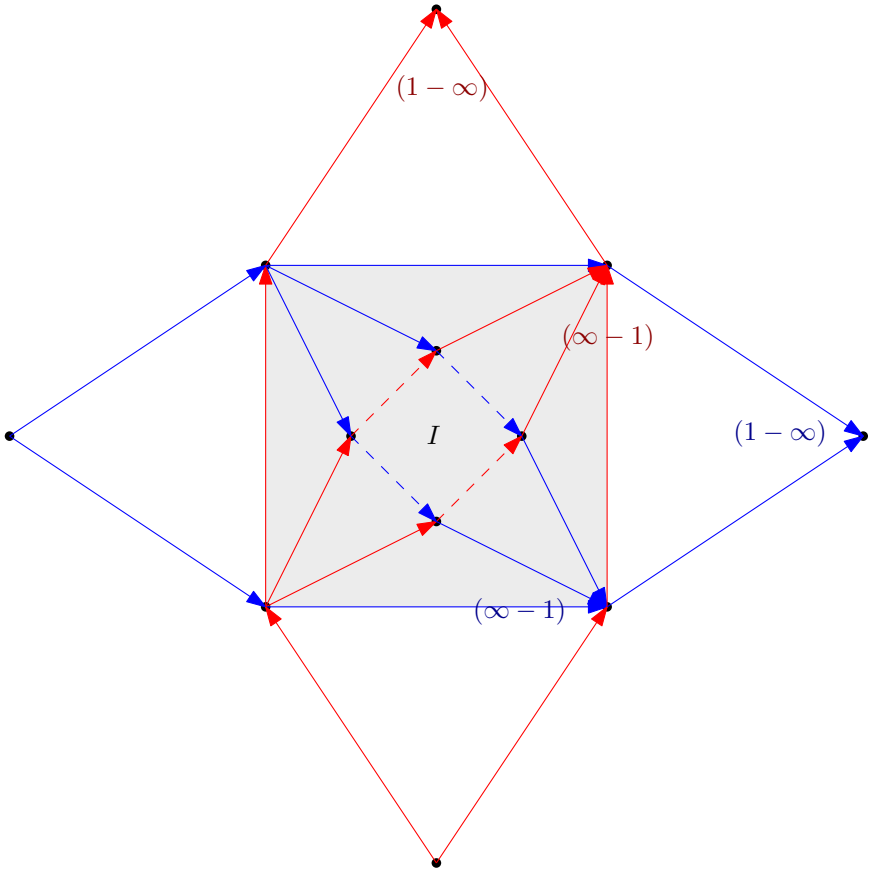


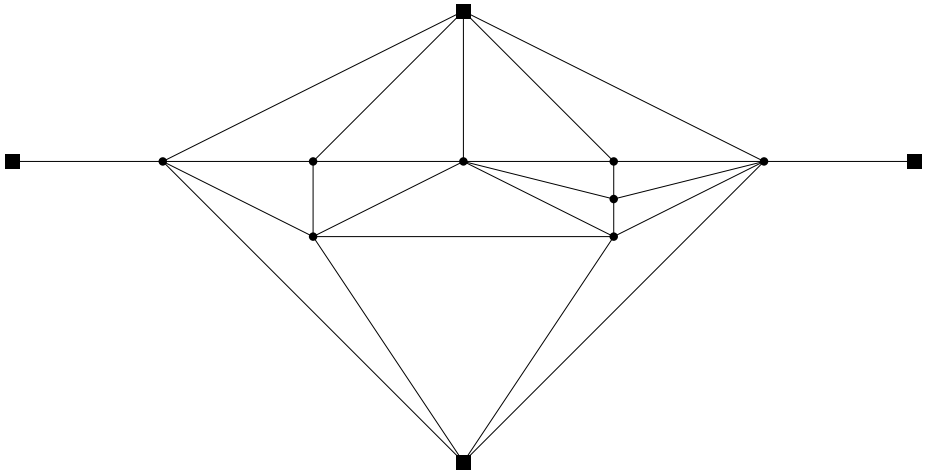
Figure 7: Encapsulated seperating 4 cycle

4 Questions

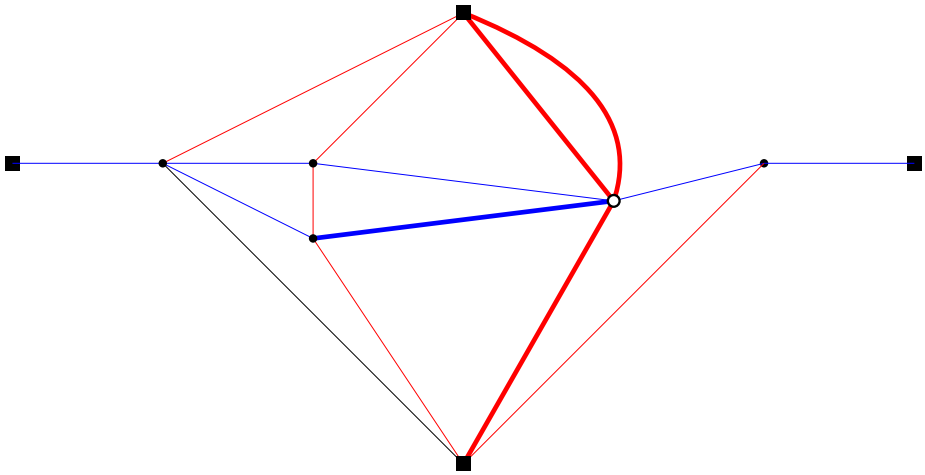
- Is a graph withoumeatt a seperating 4 cycle one-sided?
- am I on the right track? Does the red algo for graphs without a sepperating 4-cycle yield a vertically onesided graph?

Further research What colorings of the encapsulated graph are valid

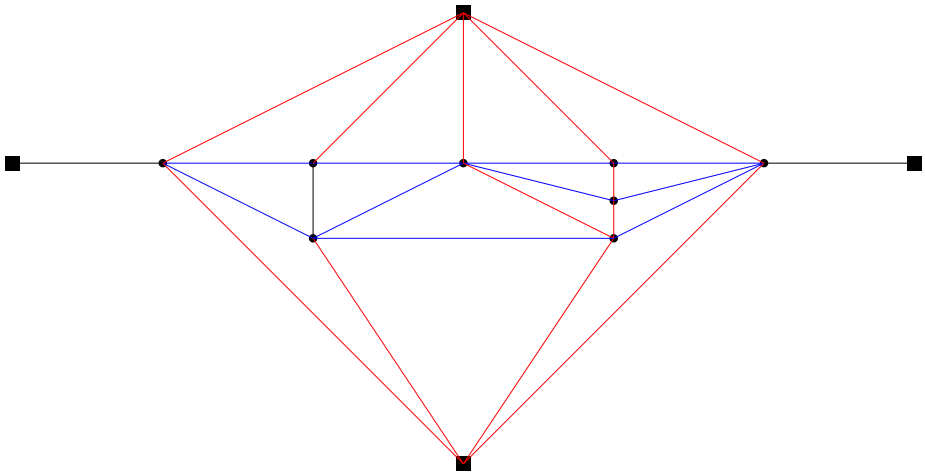
Other approaches Start with some coloring. Incrementally improve it.



(a) The graph



(b) Coloring the encapsulated graph



(c) Coloring the regular graph accordingly

Figure 8: A example of encapsulation working correctly