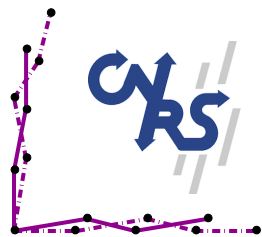


Développement des Algorithmes d'Application Réticulaire

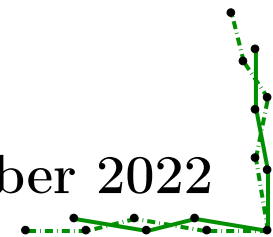
<https://www-apr.lip6.fr/~buixuan/daar2022>

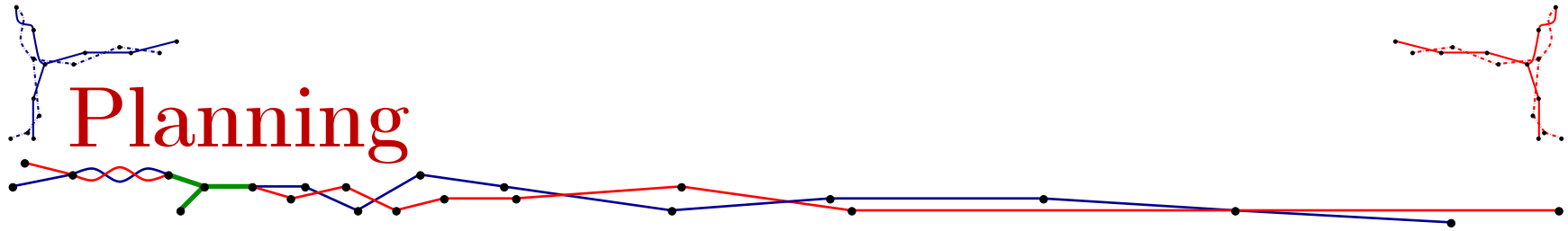
Binh-Minh Bui-Xuan



**SORBONNE
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CRÉATEURS DE FUTURS
DEPUIS 1257

PARIS, September 2022



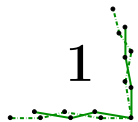
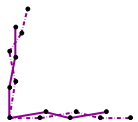


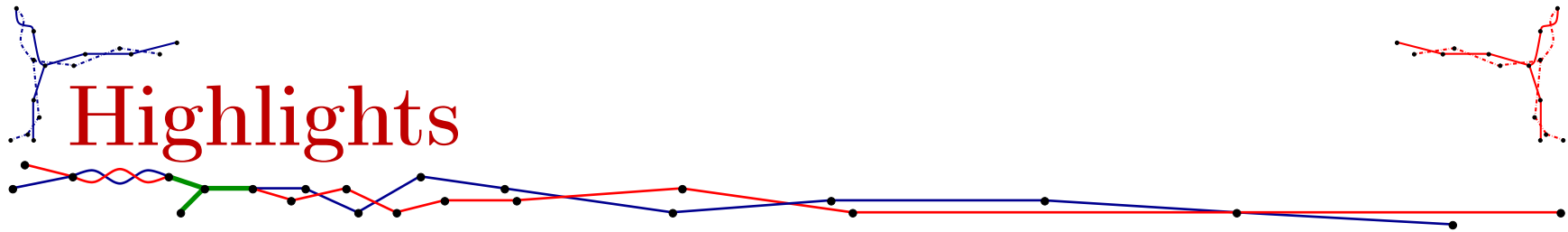
TEACHING TEAM :

- Binh-Minh Bui-Xuan (lectures)
- Arthur Escriou (lectures 2, 13, 14 + TME)
- Alfred Deivassayagame (lectures 4, 5 + TME)
- Guillaume Hivert (lectures 6, 7 + TME)
- Suxue Li (TME)

ASSESSMENT :

- session 1 = projects (70% total) + written exam (30%)
- session 2 = written exam (100%)





SEARCH ENGINE :

- desktop algorithm : RegEx ; KMP ; P-tries
- graph algorithm : data eng. (ES) ; decentralized projects (ETH) ; stream data...

PROJECT TEAMS :

- lectures 1-7 : backend algorithms
- lectures 8-14 : graph algorithms + frontend development
- final project : many choices !

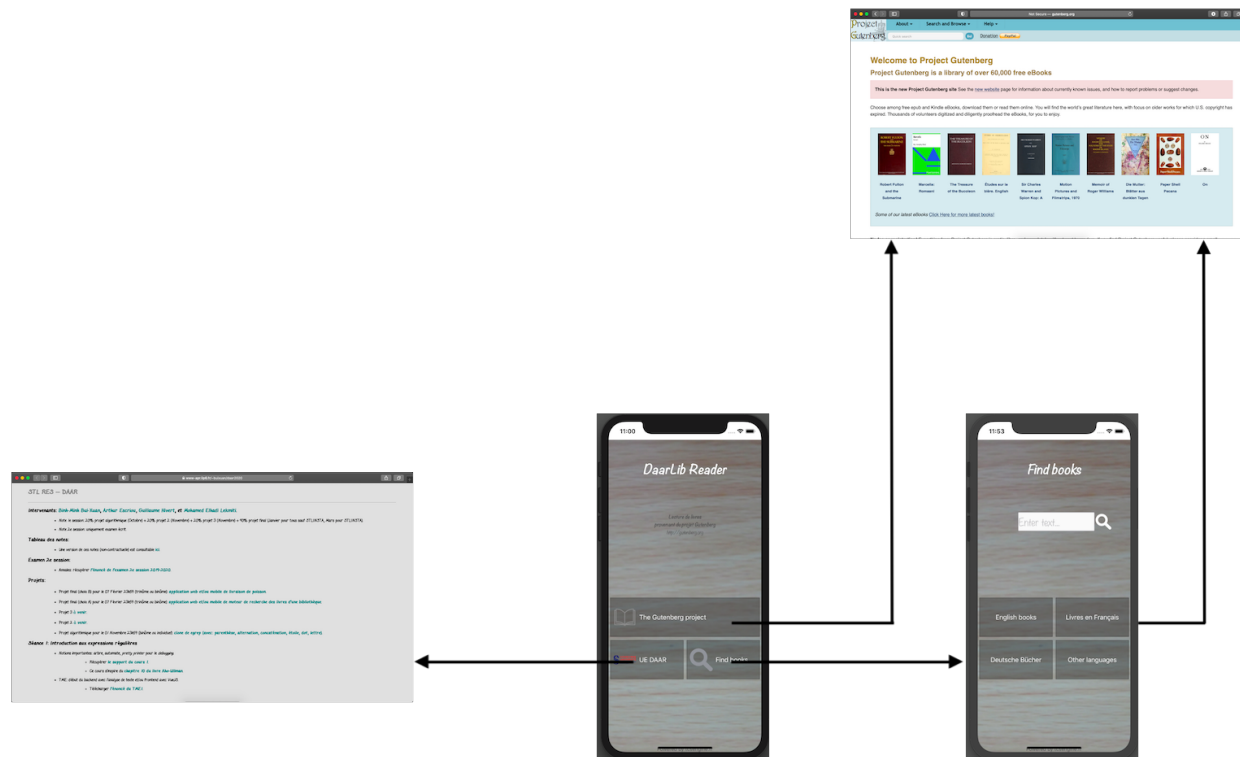
librarian app (choice A, backend)

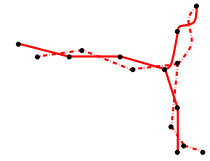
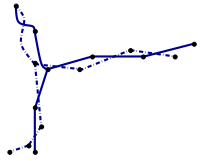
research project (choice B, routing algorithms)

itinerary app (choice C, backend++)

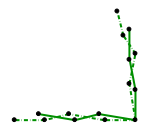
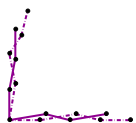
...

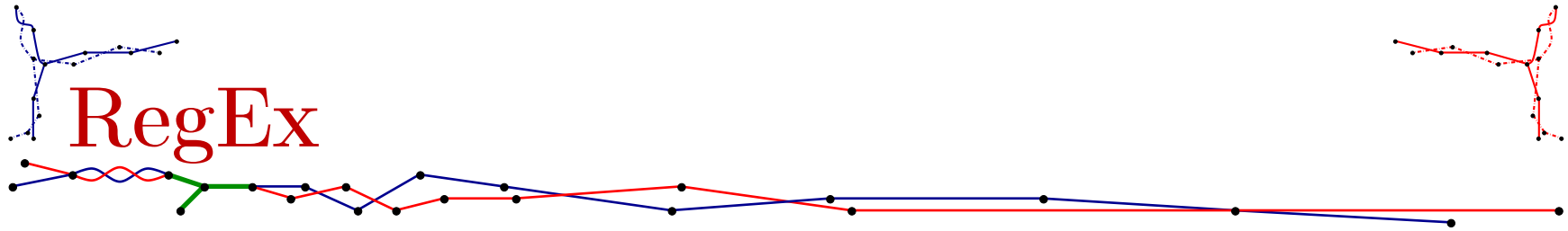
Final project example – books





Search engine :
desktop algorithm





REGEX (INPUT) \rightarrow AUTOMATON (OUTPUT)

Regex \rightarrow Regex with parenthesis (Regex tree) (1)

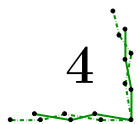
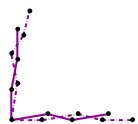
\rightarrow automaton with ϵ – transitions (2)

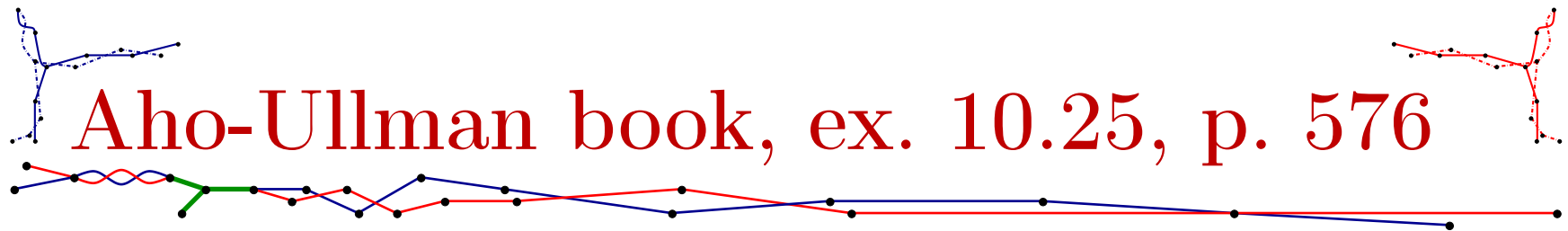
\rightarrow deterministic finite automaton (DFA) (3)

\rightarrow idem, minimum (optional step) (4)

PATTERN RECOGNITION :

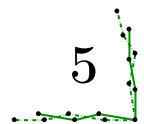
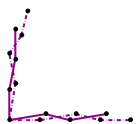
text input + DFA \rightarrow boolean (5)

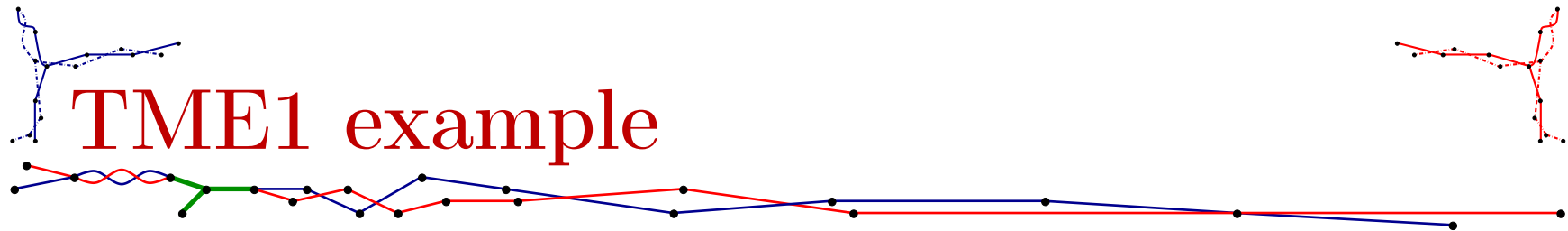




PRINCIPAL STEPS :

- RegEx "a|bc*", RegEx tree in Figure 10.29 (1)
- Figure 10.30-33 (recursive calls) (2)
- Determinisation Figure 10.35 (3)
- Minimisation Figure 10.36 (4)
- Recognition : text input "babybcc" (5)

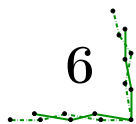
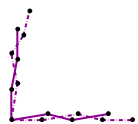




PRINCIPAL STEPS :

- RegEx "S(a|g|r)+on", RegEx tree? (1)
- Figure 10.27 + 10.28 (recursive calls)? (2)
- Determinisation (with subset algorithm)? (3)
- Naive minimisation p.555? (4)
- Recognition : text input **Babylonia history** (5)

N.B. : for project 1, we restrict ourselves to : parenthesis, alternation, concatenation, star, dot, ASCII letter.



The diagram illustrates a network structure for the TME1 example. It features a central horizontal red line with several nodes. From this line, two branching structures emerge: one on the left and one on the right. The left branching structure is primarily blue, while the right one is primarily red. Both branching structures consist of nodes connected by edges, with some edges being solid and others dashed. The central red line also has nodes at various points, some of which are connected to the branching structures. The overall layout suggests a complex network topology, possibly representing a biological or engineering system.

PRINCIPAL STEPS :

$$\text{RegEx "S(a|g|r)+on", RegEx tree?} \quad (1)$$

Figure 10.27 + 10.28 (recursive calls) ? (2)

$$\text{Determinisation (with subset algorithm)}? \quad (3)$$
$$\text{Naive minimisation p.555?} \quad (4)$$

Recognition : text input **Babylonia history** (5)

NEXT STEP : project 1, instructions on

<https://www-apr.lip6.fr/~buixuan/daar2022>

