Using Inexact Matching for Validating Communication Behavior

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Motivation

- Systems collaborate to fulfill larger task
- Communication determines reliability of systems
- Communication errors frequently lead to serious issues
Actual/Planned Communication

Protocol is specified in Interface Control Document (ICD)

Filter [8]
Cnt = 20...

BEGINPLAYBACK [0]
Cnt = 22

Data [0]

+15232ms

Data [1]

+2173ms

APID = 13...

Cnt = 871...

Cnt = 23...

+6ms

Filter [9]
Communication can be expressed as a sequence of characters.

Protocol can be expressed as a regular expression.
Output

- Indicate deviation visually
- Need to find communication that is easiest to understand
- That means with the least possible edits!
Objective

- **Goal:**
  - Design algorithm to generate the optimal solution (annotated sequence diagram)

- **Challenges:**
  - Need to match string with regular expressions
  - We don’t know where in the protocol the captured sequence begins
Approach

• Idea
  – Extend **dynamic programming** algorithm to handle regular expressions.

• Observations
  – Need to add a notion of state to keep track of where we are in the regular expression
  – Use state machines in combination with a dynamic programming table