The FloWwr Framework

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Flowchart Writer

Automated Flowchart…
Construction
Optimisation
Alteration
… for creative systems
What is it?

• Java-based platform for the development of creative systems
  • systems represented as flowcharts
  • flowchart nodes are task-specific processes
  • data transfer - output variables + input parameters
Make-up

- Flow chart editing tool
- Library of task-specific nodes
- Flow chart running
- Framework for developing nodes
- Automation tools
Motivations

• Primary - automate creative process development
  - software develops process rather than follows it
  - hand over creative responsibility at process level
  - for discovery rather than problem-solving

• Secondary - development environment & repository
  - rapid development / experiment environment
  - code sharing
  - collaboration & co-operation
Background

- automated process development
  - hand over creative responsibility
  - not greatly studied so far, see paper
    - evolutionary art, game mechanics, ILP
  - exploratory vs task-specific
- flowcharting systems
  - common, paradigm rather than aim
  - from scratch - adaptation & power vs control & simplicity
Rest of Talk

• Show the system and interface
• Show some of the flowchart-based systems
• Discuss some of the nodes in the library
• Describe the automation experiments
• Future
• Sales pitch
Scripting and Framework

- Nodes extend the `ProcessNode` class
- `ProcessOutput` classes for each node
- Flowchart a list of nodes in an underlying script
- Script includes parameters & output variables
- Execution order determined by examination
Automation

• main motivation
  - “… study the potential of automated process generation …”

• hitting the right level of complexity
  - flexible enough
  - not too complex
ELECTRONICS learning circuits

Fun circuit building experiments for beginners
Search Space

- Node Types
- Parameters x parameter values
- Output variables - sub-objects x list selection
- Arrows
- Reduced by:
  - parameter restrictions (max, min, options)
  - parameter typing
Automation modes

• alteration & optimisation
  • maximise yield, minimise runtimes
• construction
Alteration

- tongue twister generation
- automated parameter tailoring
- regex generation

\bs[a-zA-Z]\4\b\s1,\bs[a-zA-Z]\5\b\s1,\bs[a-zA-Z]\6\b

- applied to 100,000 Guardian articles
- returned 21 triples
  - ‘small screen success’
  - ‘short skirts showing’
<table>
<thead>
<tr>
<th>S</th>
<th>NW</th>
<th>FWLen</th>
<th>WLCh</th>
<th>FLCh</th>
<th>LLCh</th>
<th>Yield(%)</th>
<th>Av.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>3-6</td>
<td>equal</td>
<td>equal</td>
<td>none</td>
<td>55</td>
<td>48.6</td>
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<tr>
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<td>3</td>
<td>3-6</td>
<td>equal</td>
<td>any</td>
<td>none</td>
<td>42</td>
<td>12.1</td>
</tr>
<tr>
<td>3</td>
<td>3-5</td>
<td>3-6</td>
<td>any</td>
<td>any</td>
<td>none</td>
<td>24</td>
<td>9.24</td>
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<tr>
<td>4</td>
<td>3</td>
<td>3-6</td>
<td>incr.</td>
<td>incr.</td>
<td>none</td>
<td>38</td>
<td>5.1</td>
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<tr>
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<td>3-5</td>
<td>3-6</td>
<td>any</td>
<td>any</td>
<td>any</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2: Regex generation test yields (tongue twister texts).

<table>
<thead>
<tr>
<th>posted</th>
<th>pretax</th>
<th>profit</th>
<th>cancer</th>
<th>despite</th>
<th>everyone</th>
<th>classy</th>
<th>devices</th>
<th>emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>please</td>
<td>please</td>
<td>please</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>petrol</td>
<td>prices</td>
<td>played</td>
<td>carbon</td>
<td>dioxide</td>
<td>expelled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>profit</td>
<td>public</td>
<td>policy</td>
<td>carbon</td>
<td>dioxide</td>
<td>emission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>poorer</td>
<td>people</td>
<td>pushed</td>
<td>choice</td>
<td>defense</td>
<td>everyone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WordNet suggestions

hypernyms

organism  being

animal

hyponyms

flora  person  mammal
Optimisation
Construction

{Twitter, Guardian, TextReader}

optional {WordSenseCategoriser, SentimentCategoriser}

{TextRankKeyphraseExtractor, RegexPhraseExtractor}

optional {WordSenseCategoriser, SentimentCategoriser}

{FootprintMatcher, RhymeMatcher}

• poetic couplet generation

• 108 node combos, 27k parameter options, 261m variables

• 200 runs generated 17 (8.5%) successfully running scripts

• output of 1-4m couplets
- 17 Guardian articles from first week of 2012
- one random neutral article
- extract key phrases
- select those starting with an adjective
- find same-syllable pairings

<table>
<thead>
<tr>
<th>actual bodily harm</th>
<th>chief inspector working</th>
<th>dangerous driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>metropolitan police</td>
<td>domestic violence</td>
<td>potential recruits</td>
</tr>
</tbody>
</table>
52 couplets - [great air battle/despairing men] [greater efforts/greater ordeals]
Churchill’s War

Good many people, great differences
good many people: outstanding increase.
Great organisations, greater security
greater security: terrible position

Great combatants, brilliant actions
Great preponderance, greater efforts

Great air battle, despairing men
Great air battle, brilliant actions

Great Britain, good account
Great Britain, good reason

Great flow: Great war
Great flow: Good men

Chess proceeds, good reason
Chess proceeds: victory

- curated by Russell Clarke
Summary

• Does everything we want it to so far
  - initial automation
  - promise for code sharing & collaboration
  - experimentation

• Currently being used - online whim machine

• Web version significantly improves on paper
Future

- Automation
  - alteration
  - optimisation
  - creation
  - evolutionary aspects to process generation (c.f. evolvable hardware)
  - assessment of success
  - genetic programming with our scripts
Future

• Open it up to everyone
  - multi-user & security
  - collaboration tools

• GUI improvements
  - cross-browser
  - bespoke inputs e.g. datepickers
  - output types (images, sound, video)
  - delivery (website, links, email, store)
  - auto-layout

• Add-ons
  - scheduled running & notifications
  - create tweetbot
  - deploy as standalone / website
  - charts as compound nodes
  - auto FACE-model detection

• Library
  - web services (e.g. MetaphorMagnet)
  - facilitating tools (auto web service)
  - developer toolkit
  - other language wrappers
  - mash ups
  - versioning
  - more domains (mainly NLP now)
  - we’ll help anyone who’s keen
  - other Toolkits e.g. Pattern

• Other systems
  - The Painting Fool, HR3, Nehovah …
  - feeds into library

• Looping & iteration
  - TBD
  - training nets
  - evolutionary approaches
Future

- Automation
  - running all the time trying all combinations
  - on our server
  - tweeting results
Sales Pitch

ETA July

we’ll help

we need your nodes
Sales Pitch

IT’S GOING TO BE FREE
Sales Pitch

FREE!
Sales Pitch

FREE!
Sales Pitch

FREE!
Sales Pitch

FREE!