Zurich – Madrid
Simple Models of Computation

To complement the 30th Anniversary of SIROCCO, there will be a tutorial session on Special Models of Computation on June 6th. In this session, SIROCCO researchers will share the histories and open problems for distributed computing models that bridge computer science theory to other interdisciplinary aims.
On the Measure of Intelligence

François Chollet *

Google
Abstract Visual Reasoning Enabled by Language

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Swarm Intelligence

Does it exist? If yes, how can we find it?

Roger Wattenhofer
Swarm Intelligence Cup
AI through emergence
Related Work
Computation in networks of passively mobile finite-state sensors
The ANTS Problem*
The Canonical Amoebot Model: Algorithms and Concurrency Control

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Christian Scheideler
Department of Computer Science, Paderborn University, Paderborn, Germany
Convay’s Game of Life
High-res 3D simulations

up to 19k particles
2 different simulators (MPM & SPH)
Automating Rigid Origami Design
Jeremia Geiger, Karolis Martinkus, Oliver Richter, Roger Wattenhofer
Folding DNA to create nanoscale shapes and patterns

Paul W. K. Rothemund
AGENT-BASED GRAPH NEURAL NETWORKS

Karolis Martinkus\textsuperscript{1}, Pál András Papp\textsuperscript{2}, Benedikt Schesch\textsuperscript{1}, Roger Wattenhofer\textsuperscript{1}

(a) The Graph has triangles!

(b) I see a triangle!

(c) I didn't see a triangle.

(d) Me neither.

(e) 1. Node Update

(f) 2. Neighborhood Aggregation

(g) 3. Agent Update

(h) 4. Agent Transition

I've been there 3 steps ago!

I keep seeing these nodes!
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>GIN [75]</td>
<td>50.0 ±0.0</td>
<td>10.0 ±0.0</td>
<td>50.0 ±0.0</td>
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<tr>
<td>GIN with random features [64; 1]</td>
<td>99.7 ±0.4</td>
<td>95.8 ±2.1</td>
<td>92.4 ±1.6</td>
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<tr>
<td>SMP [71]</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
<td>50.0 ±0.0</td>
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<tr>
<td>DROPGIN [59]</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
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<tr>
<td>ESAN [8]</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0*</td>
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<tr>
<td>1-2-3 GNN [53]</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0†</td>
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<tr>
<td>PPGN [51]</td>
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<td>100.0 ±0.0</td>
<td>50.0 ±0.0</td>
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<td>CRAWL [67]</td>
<td>100.0 ±0.0</td>
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<tr>
<td><strong>Random Walk AgentNet</strong></td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
<td>50.5 ±4.5</td>
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<tr>
<td><strong>Simplified AgentNet</strong></td>
<td>100.0 ±0.0</td>
<td>100.0 ±0.0</td>
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<tr>
<td><strong>AgentNet</strong></td>
<td>100.0 ±0.0</td>
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Hide & Seek
Each step uses every example

Average over all training examples

Cost of one example

784
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There are ants on the grid.
1 1 0 0 1 1 1 0
+ 1 0 1 0 0 1 1 1
1 0 1 1 1 1 0 0 1