Loon
Using Exemplars to Visualize Large-Scale Microscopy Data

Devin Lange, Eddie Polanco, Robert Judson-Torres, Thomas Zangle, Alexander Lex

http://loon.sci.utah.edu/
Motivation
Improve Cancer Treatment
Motivation - Improve Cancer Treatment

Challenges:
Motivation - Improve Cancer Treatment

Challenges:

- Cancer is heterogeneous
Motivation - Improve Cancer Treatment

Challenges:

• Cancer is heterogeneous

• Many treatment options exist
Motivation - Improve Cancer Treatment

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Motivation - Improve Cancer Treatment

Challenges:

• Cancer is heterogeneous
• Many treatment options exist

Goal:

• Identify effective treatment option for individuals
Quantitative Phase Microscope
Quantitative Phase Microscope

96-Well Plate
Quantitative Phase Microscope

96-Well Plate
Quantitative Phase Microscope

96-Well Plate
Quantitative Phase Microscope

96-Well Plate
Quantitative Phase Microscope

96-Well Plate

Imaging a Single Well
Imaging a Single Well
Imaging a Single Well
Imaging a Single Well
Imaging a Single Well

Segmentation
Imaging a Single Well
Tracking Cell Over Time
Tracking Cell Over Time
Tracking Cell Over Time
Tracking Cell Over Time
Tracking Cell Over Time
Tracking Cell Over Time
Tracking Cell Over Time
Cell and Track Attributes

- Average Mass
- Growth Rate
- Track Length
- Current Mass
- Shape Factor
- Density
Exemplars
Exemplars

Representative data points that include important contextual information that cannot be summarized.
Growth Curves
<table>
<thead>
<tr>
<th>Mass</th>
<th>Shape Factor</th>
<th>Growth Rate</th>
</tr>
</thead>
</table>

Sort by:
- Mass
- Shape Factor
- Growth Rate
<table>
<thead>
<tr>
<th>Percentile</th>
<th>Sample Tracks</th>
<th>Sort by</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th Percentile</td>
<td>Mass, Shape Factor, Growth Rate</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95th Percentile</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5th, Median, 95th Min, Median, Max 25th, Median, 75th
5th Percentile

Median

95th Percentile

Sample Cells
Sample Cells

- 5th Percentile
- Median
- 95th Percentile
Time

Sample Cells

5th Percentile

Median

95th Percentile

- 5th Percentile
- Median
- 95th Percentile
Align Cells
Final Display
Distribution of Mass
Mass Over Time

5th Percentile
Median
95th Percentile
Demo
https://loon.sci.utah.edu/
Discussion
Criteria for applying exemplars
Criteria for applying exemplars

- Rich contextual data that cannot be summarized
Criteria for applying exemplars

• Rich contextual data that cannot be summarized
• Dataset is sufficiently large
Future Work
Future Work

- Apply the concept of exemplars to other situations
- Develop new enhancements to Loon e.g. Cell Lineage
Thank You!
Loon

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