CROWDCLASS: DESIGNING CLASSIFICATION-BASED CITIZEN SCIENCE LEARNING MODULES

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HCOMP, 10/31/2016
Classify

SHAPE
Is the galaxy simply smooth and rounded, with no sign of a disk?

- Smooth
- Features or disk
- Star or artifact

What types of cell shapes (if any) do you see in this image? Select the types you can see and click done. If you don’t see any click none.

- Irregular
- Tissue
- Blood Cells
- None

Antelope/deer

Make a choice

Great, that leaves us with just one option! Let’s choose “Wildebeest” it and make sure it’s a match.
Worker Motivation

Citizen Scientist ≠ Crowdworker
Engagement in Citizen Science

Macro-level
community forum, external documentation

Micro-level
pattern recognition, rule-based learning, workflow

Jennett et al. (2016), Iacovides et al. (2011)
Classify the objects based on color

"Carrots contain keratin"

Does this object contain keratin?
Related Works

**LevelUp** [Dontcheva et al, CHI’14]

**Duolingo** [von Ahn, IUI’13]

**Crowdy** [Weir et al, CSCW’15]

**Foldit**

**Eyewire**
Classify

Note: Please always classify the galaxy in the centre of the image.

SHAPE
Is the galaxy simply smooth and rounded, with no sign of a disk?

Smooth
Features or disk
Star or artifact
Crowdclass Workflow

Ellipticals

Elliptical galaxies are the most abundant type of galaxy in the universe. But when we actually look up at the night sky, we actually see more spiral galaxies than ellipticals! That's because ellipticals galaxies appear dimmer because of their smooth light profile that exhibits almost no additional features. These elliptical galaxy also contain old, low-mass stellar populations that have very little star formation activity. On the other hand, spiral galaxies contain young bright stars that make them easier to see.

Classify

Elliptical

Is this object likely to contain old stellar populations that lack star formation?

Yes

No
**Workflow Generation**

**Facts**
- Has high rates of star formation
- Arms contain mostly young, blue stars
- Is made of gas and dust
- Too broad

**Questions**
- Is this galaxy likely to have **high** rates of star formation? ✗ T
- Is this galaxy likely to have **low** rates of star formation? ✗ F

**Classification**
- Spiral
- Not Spiral
Experiment

Pre-test → Learning Scores → Post-test

Classification Accuracy

93 AMT participants

Hubble's Classification System

Spiral Galaxies

Edge-on vs. Face-on observations

In many cases, when galaxies are viewed edge-on, it is hard to visually distinguish whether it is an elliptical or spiral. Unfortunately, since these galaxies are so large and far away from us, it is impossible to resolve our telescope to view them face-on. Fortunately, astronomers can often infer the properties of these galaxies by taking more detailed studies of their galaxies (by looking at its species or observing fans at different wavelengths). By using some of the relationships between galaxy morphologies and their properties, we can obtain a good sense of whether the galaxy is an elliptical or a spiral galaxy.

Classify

Note: Please always classify the galaxy in the center of the image.

Elliptical

Could this galaxy have lost its structures through collisions with other galaxies?

Yes

No
Learning is effective.

Score

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
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<td>Pre-test</td>
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<td>Post-test</td>
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Envisioned Applications
Summary

• Content learning within microtasks is important.

• Crowdclass: classification + learning quiz

• Future directions: longitudinal study, feedback
THANK YOU!

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