

Learning Stellar Evolution by Classifying Trees

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The human lifetime is much shorter than the timescales of stellar evolution. Most of our knowledge about the formation, life, and final fates of stars is based on our very recent snapshot of the Universe. Even professional astronomers often lack the awareness that stellar evolution is not an observational evidence. We rather classify stars in their current evolutionary stages (e.g. "Hertzprung–Russell diagram") and interpolate based on theoretical models.

To make students better understand our classification-based model of the life cycle of stars, I present a new classroom exercise: the students are asked to classify trees. Like stars, trees come in different sizes, ages, colours, or environments but have the main advantage that we are familiar to their evolution, which occurs on much shorter timescales. Groups of students get pictures of about 100 trees and have to classify them based on their own criteria, for example:

Definition

What is a star?



Variability

We may witness a transient phenomena



Size

Stars can have different sizes at different evolutionary stages:



Or have the same size but nothing else in common:



Colour

Are stars related because they have the same colour?



Remnants

Stellar remnants may look very different



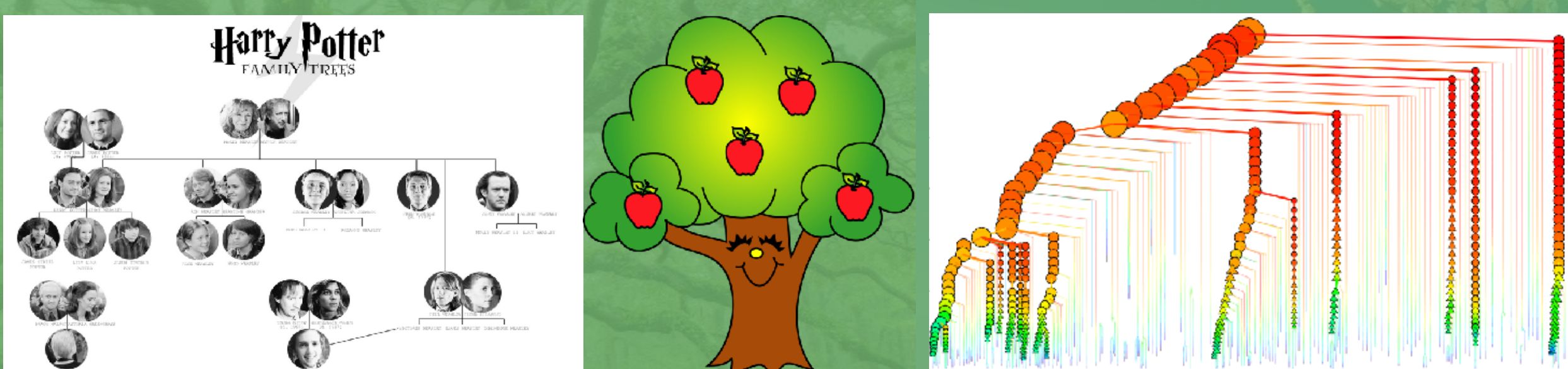
Multiplicity

The source density can affect our interpretation



Mimicry

Some light sources may not be stars but planets, AGNs, galaxies, satellites,...



Environment

The environment can alter our classification of stars



This hands-on experience and the subsequent classroom discussion demonstrate the cognitive process behind our model of stellar evolution, allows the students to create their own “botanical HRD diagram”, and to understand the main concepts of stellar classification in a playful, interactive way. Please contact me to obtain the tree files to print:
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