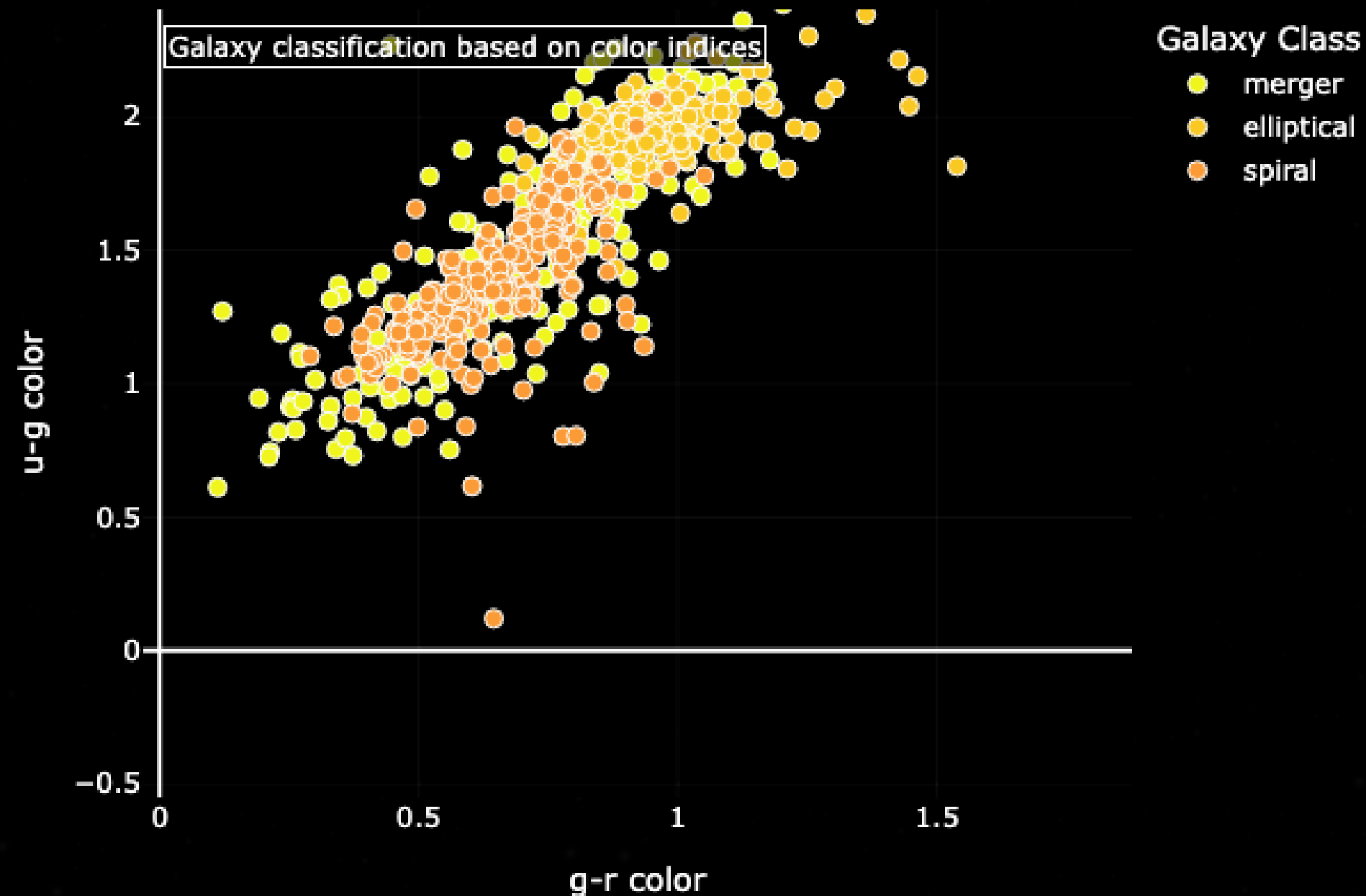


Understanding Galaxy with Analytics and ML

Hrishikesh Yadav

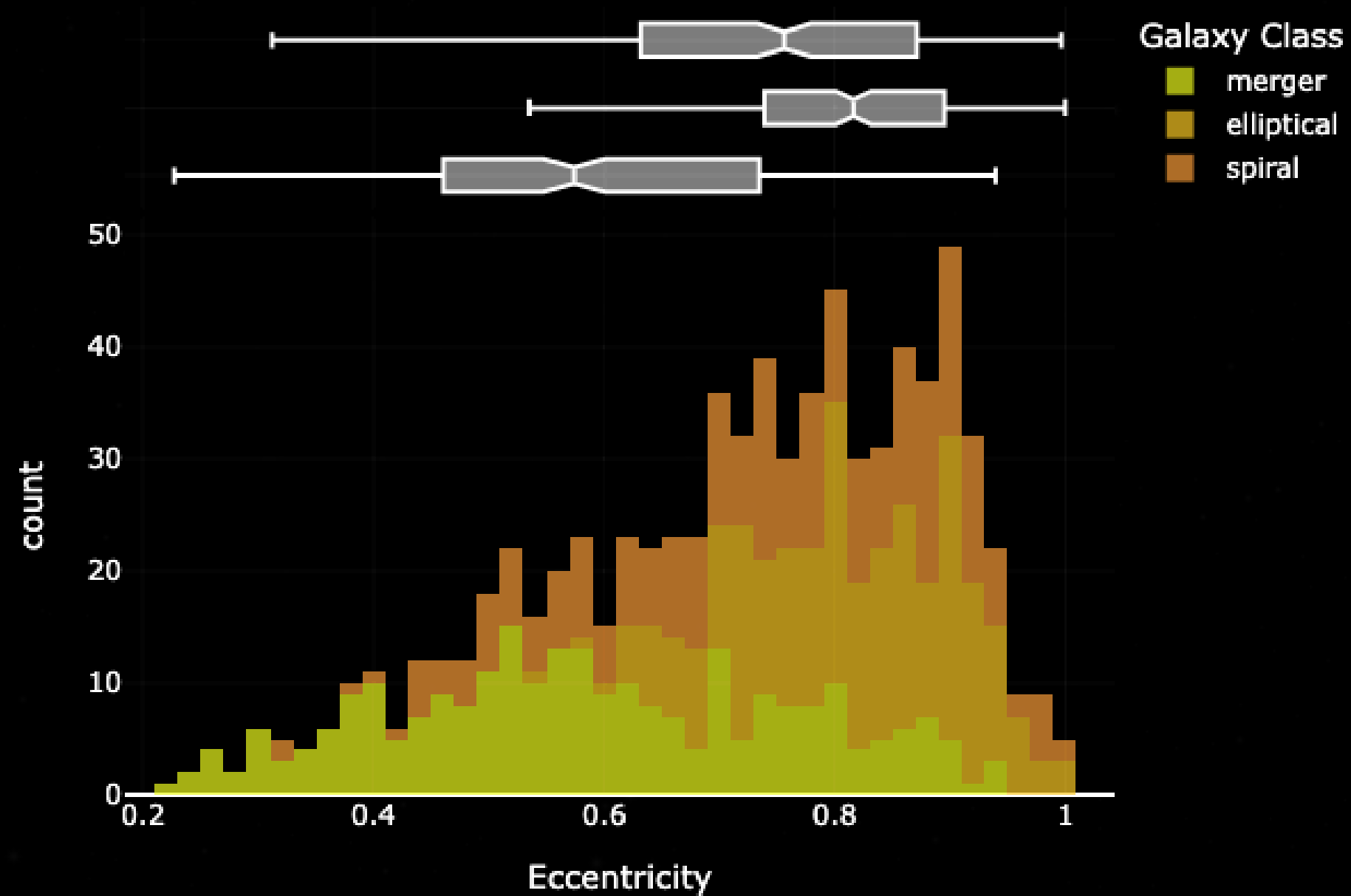
Galactic Color-Color Diagram with u-g vs g-r



Reasoning based on the colors of the plots

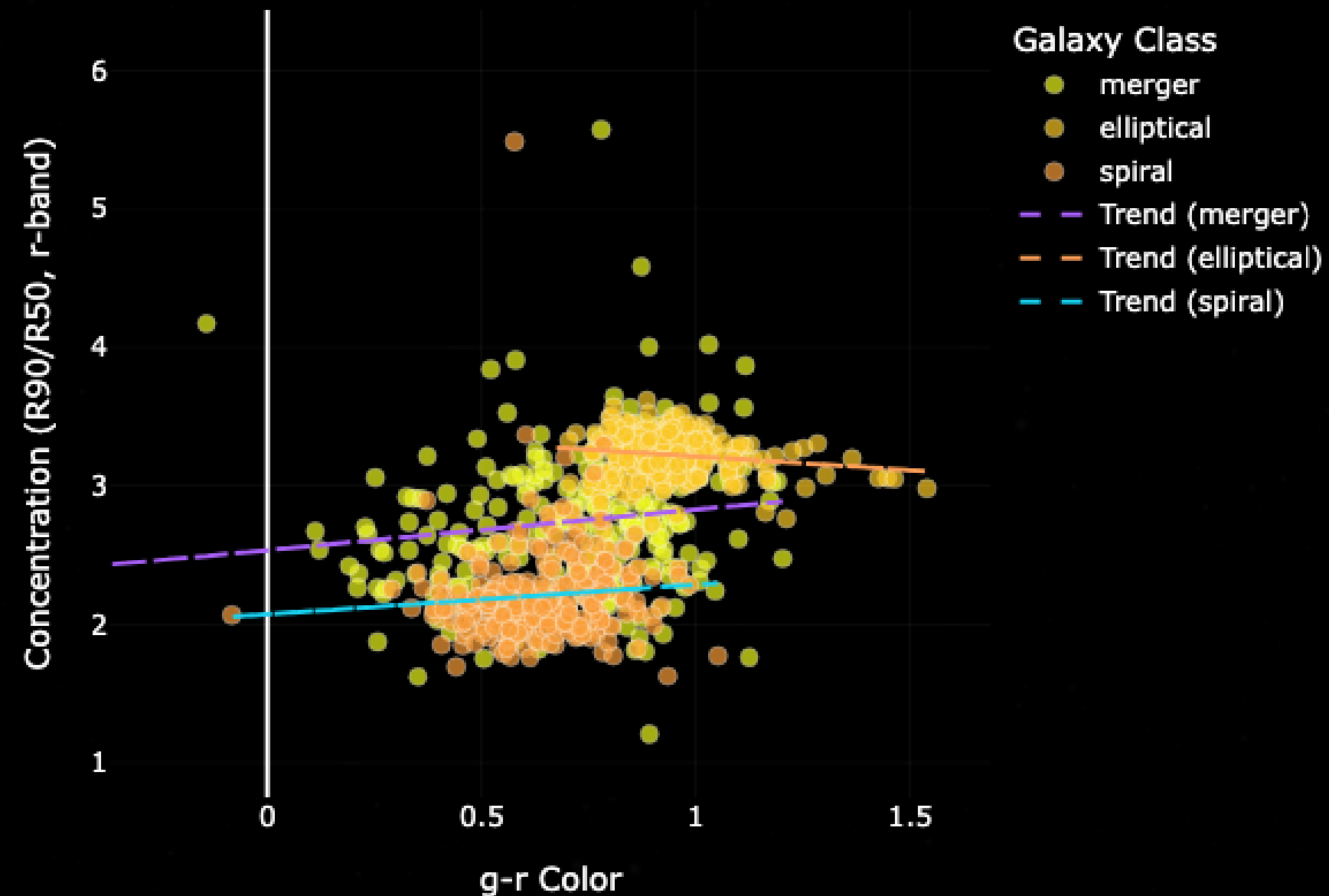
- Spiral galaxies (orange points) tend to concentrate in the lower-left region (lower u-g and g-r values)
 - Younger stellar populations and ongoing star formation
- Elliptical galaxies (yellow points) dominate the upper-right region (higher u-g and g-r values)
 - Older stellar populations with less recent star formation
- Merger galaxies (green points) are more scattered throughout.
 - scatter reflects their disturbed nature and mixed stellar populations

Cosmic Shapes: Distribution of Galaxy Eccentricity



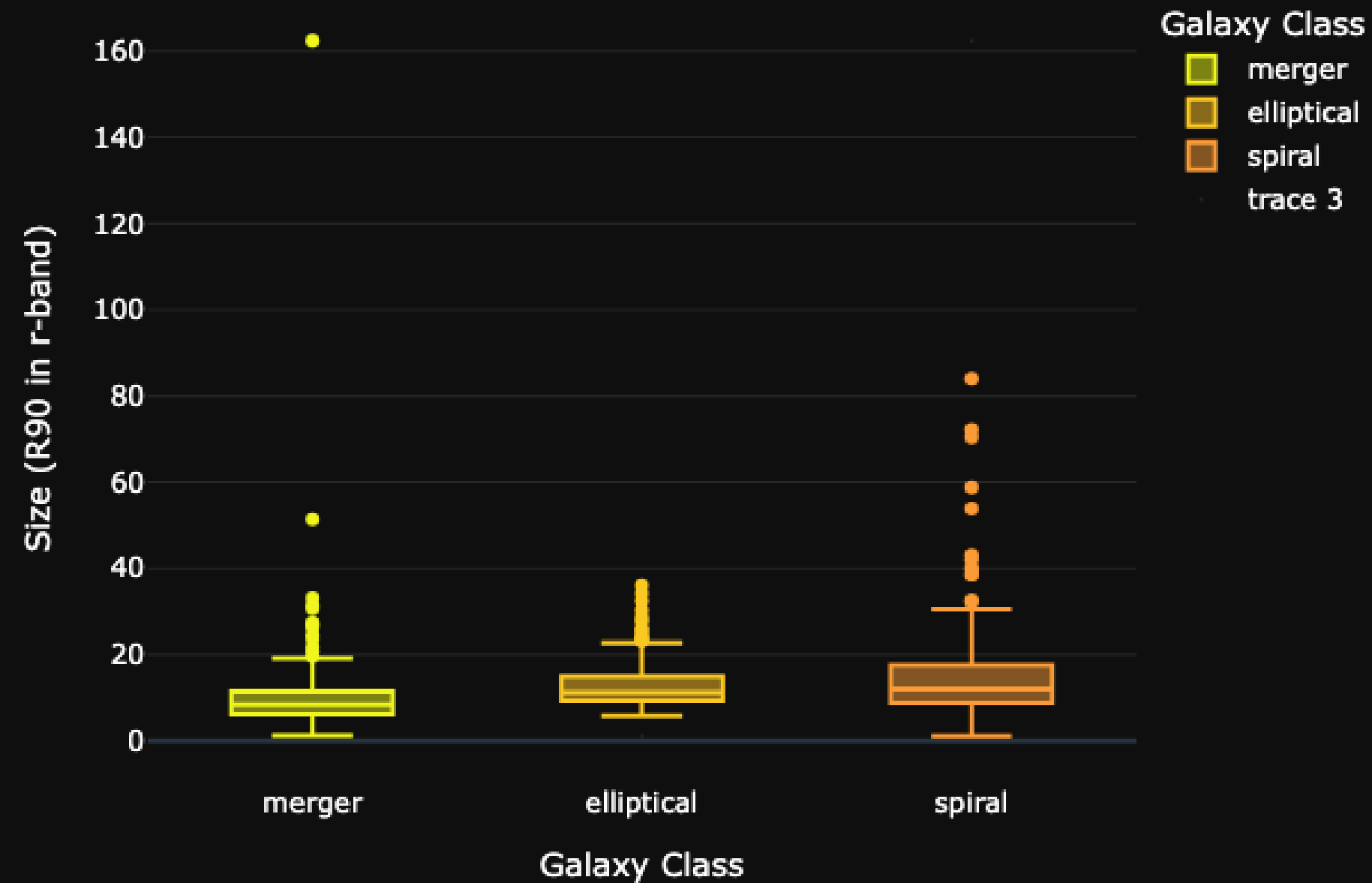
- Spiral galaxies (orange/coral) dominate the higher eccentricity range (0.7-1.0)
- Elliptical galaxies (yellow) show a broader distribution across eccentricities
- Merger galaxies (green) appear less frequently and tend toward lower eccentricities
- Median values differ among galaxy types
- Merger galaxies show the widest spread (largest box and whiskers)
- Spiral galaxies show the most compact distribution

Relationship of Galaxy Concentration and Color



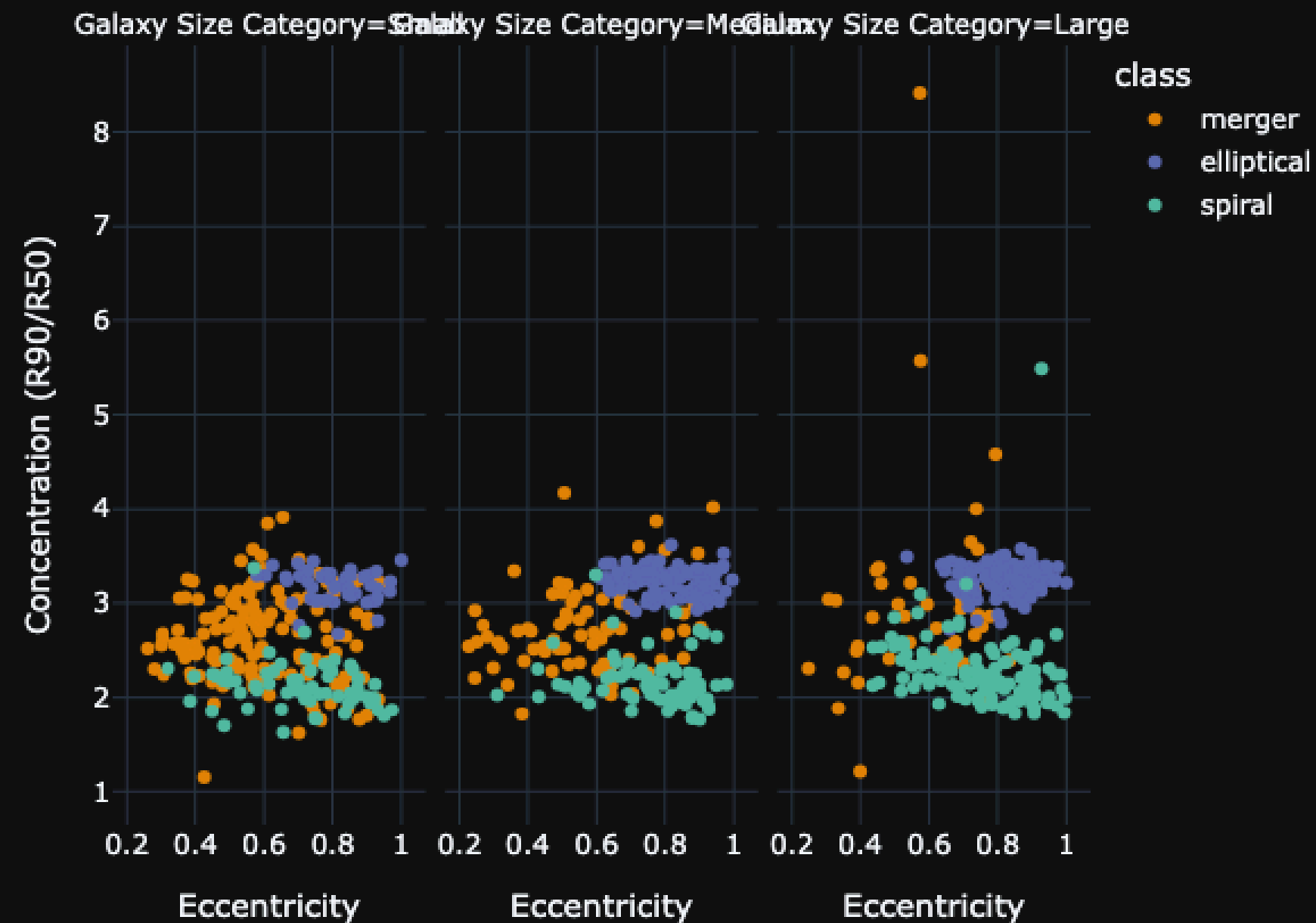
- This relationship here is evolutionary connections between galaxy structure and stellar populations.
- More concentrated galaxies (typically ellipticals) have older, redder stellar populations.
- Less concentrated galaxies (typically spirals) have younger, bluer stellar populations.

Distribution of Galaxy Sizes by Class



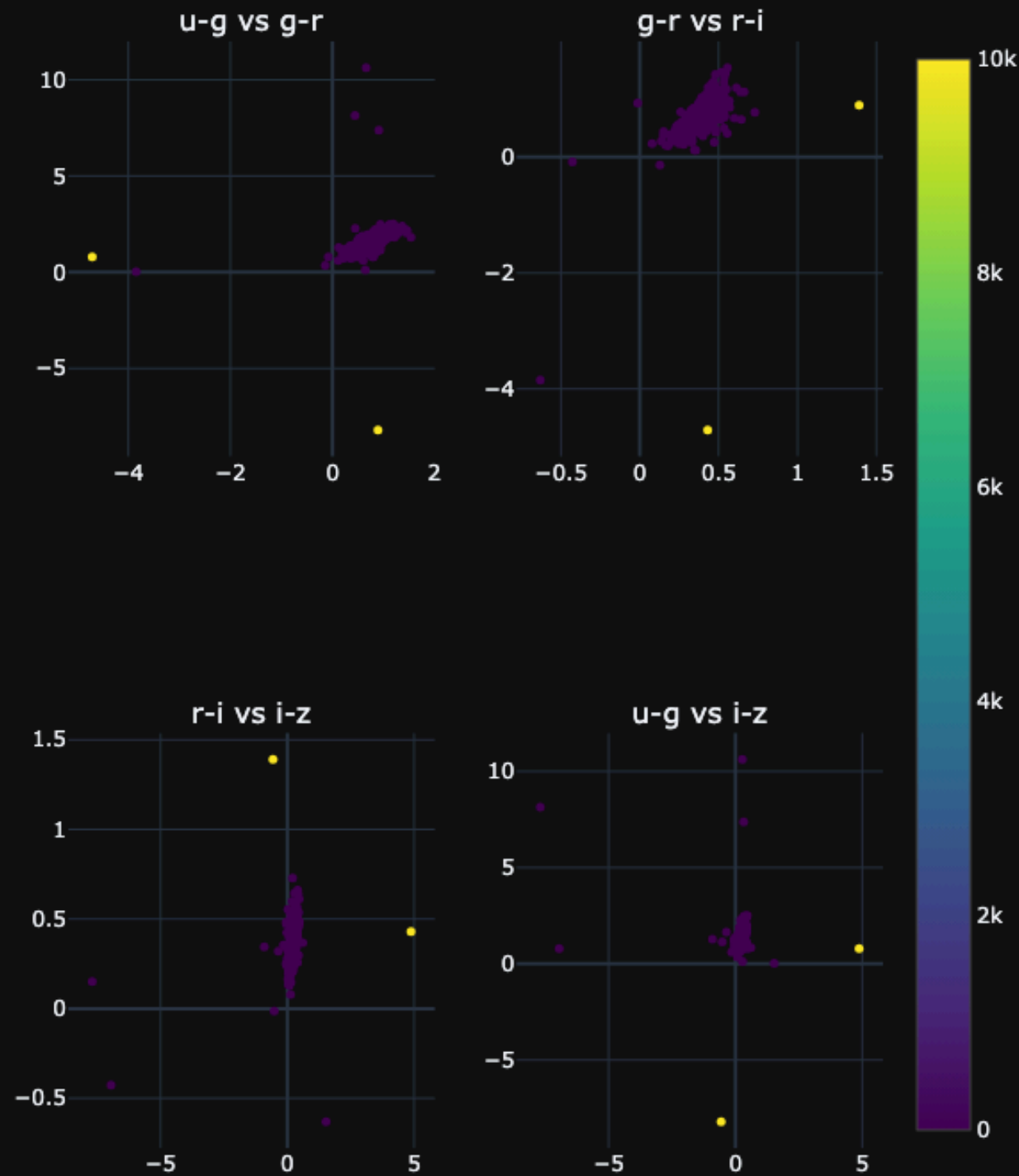
- The median sizes are fairly similar across all three classes
- Spiral galaxies show the most variability in size
- All classes show positive skew (outliers toward larger sizes)
- Each class has distinctive outlier patterns
- Size isn't a strong discriminator between galaxy types

Eccentricity vs. Concentration for Different Galaxy Sizes



- Clear separation between spiral and elliptical populations based on concentration
- Eccentricity shows less clear separation between galaxy types
- Concentration range increases with galaxy size
- Galaxy morphology (shape/concentration) is relatively independent of size
- Merger events can produce extreme values in both parameters

Spectral Index Relationships





- Strong correlations between adjacent wavelength bands.
- Weaker correlations between non adjacent bands.
- Most galaxies follow well defined spectral sequences.
- Outliers more common in u-g measurements.
- Consistent patterns suggest regular galaxy evolution paths.
- Outliers might indicate unusual star formation histories or active galactic nuclei.


Thank You


For more Information, Detailed analysis and applied machine learning on understanding Galaxy. Go to


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