Telescope Spectrum Classification

The data set was generated by a Monte Carlo program, Corsika to simulate registration of high energy gamma particles in a ground-based atmospheric Cherenkov gamma telescope using the imaging technique. Cherenkov gamma telescope observes high energy gamma rays,

taking advantage of the radiation emitted by charged particles produced

inside the electromagnetic showers initiated by the gammas, and developing in the

atmosphere. This Cherenkov radiation (of visible to UV wavelengths) leaks

through the atmosphere and gets recorded in the detector, allowing reconstruction

of the shower parameters. The available information consists of pulses left by

the incoming Cherenkov photons on the photomultiplier tubes, arranged in a

plane, the camera. Depending on the energy of the primary gamma, a total of

few hundreds to some 10000 Cherenkov photons get collected, in patterns

(called the shower image), allowing to discriminate statistically those

caused by primary gammas (signal) from the images of hadronic showers

initiated by cosmic rays in the upper atmosphere (background).

Your Task is to make use of Machine Learning models to

classify high energy Gamma particles in atmosphere based on the features provided

1. fLength: major axis of ellipse [mm]

2. fWidth: minor axis of ellipse [mm]

3. fSize: 10-log of sum of content of all pixels [in #phot]

4. fConc: ratio of sum of two highest pixels over fSize [ratio]

5. fConc1: ratio of highest pixel over fSize [ratio]

6. fAsym: distance from highest pixel to center, projected onto major axis [mm]

7. fM3Long: 3rd root of third moment along major axis [mm]

8. fM3Trans: 3rd root of third moment along minor axis [mm]

9. fAlpha: angle of major axis with vector to origin [deg]

10. fDist: distance from origin to center of ellipse [mm]

11. class: g = gamma (signal), h = hadron (background)