PROJECT PROPOSAL

HARNESSING MACHINE LEARNING FOR ATMOSPHERIC RETRIEVAL OF EXOPLANETS

~*Unveiling stellar secrets*

By Swastik and Tasneem
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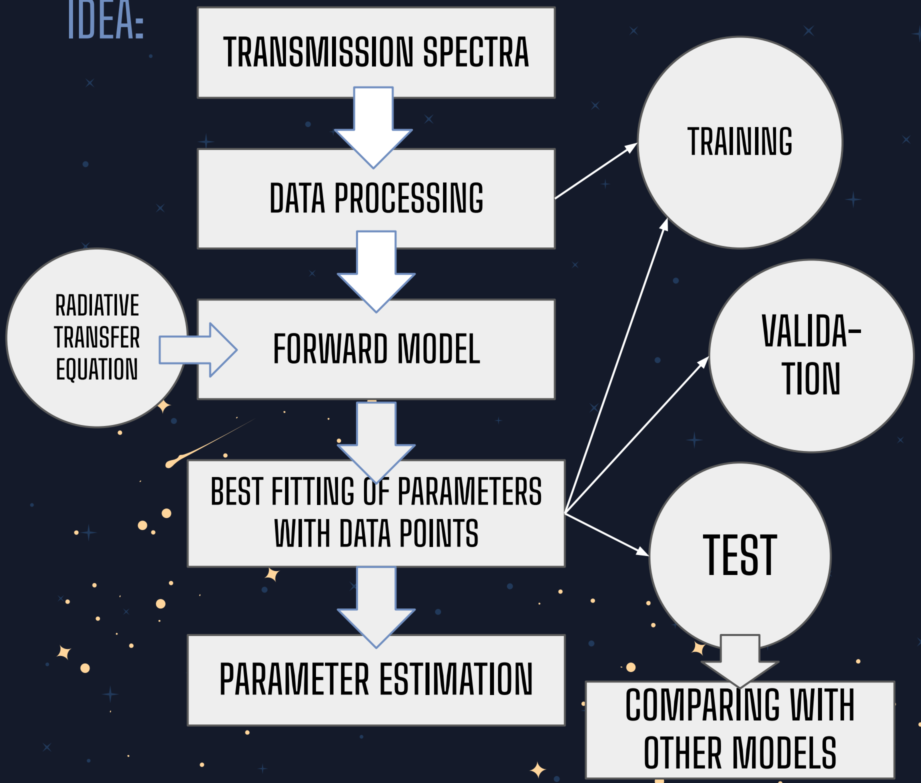
IDEA:



RELEVANT PAPERS:

1. *Madhusudan, Atmospheric Retrieval of Exoplanets arXiv:1808.04824v1*
2. *Martínez, FlopPITy: Enabling self-consistent exoplanet atmospheric retrievals with machine learning. arXiv.org.*
3. *Lueber, A. , Intercomparison of Brown Dwarf Model Grids and Atmospheric Retrieval Using Machine Learning.*
4. *Hayes et al, Optimizing exoplanet atmosphere retrieval using unsupervised machine-learning classification. Monthly Notices of the Royal Astronomical Society.*

WORK DIVISION:

Literature Review	Swastik, Tasneem
Data pre-processing	Tasneem
Testing various algorithms (**NN, k-means +NS,PCA, RF,etc**)	Swastik, Tasneem
Enhancing retrieval model	Swastik, Tasneem
Coding	Swastik
Documentation	Tasneem

DATA:

1. HST and simulated JWST - for observational spectra
2. ARCiS - synthetic forward model generator
3. ExoMol - database for molecular abundances

BY MID WAY :

- Study the radiative transfer equation essential for modeling of parameters, and subsequent literature review (covering the baseline, work done by previous authors).
- Testing and Comparing previous Atmospheric Retrieval models (HELA, PetitRADTRANS,etc).
- Selection of optimal algorithm for fitting of parameter and Dimensional reduction algorithm for faster evaluation of likelihood.
- Initialisation of building of the model, if possible, first set of training.

EXPECTED FINAL RESULT:

- **Getting final spectral parameter values with better accuracy and/or lower computational cost, relative to previous retrieval models.**