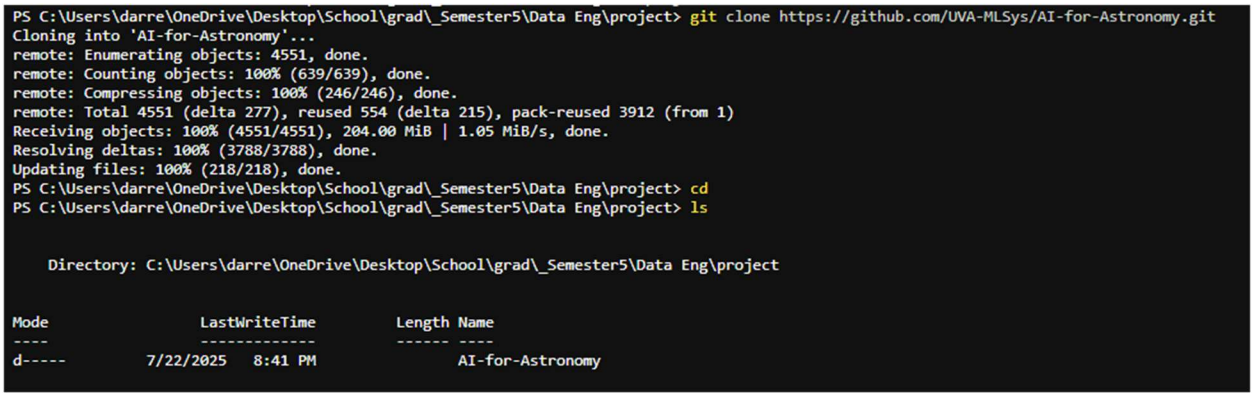
Darreion Bailey, Sam Knisely

Step 3:

1) Clone repo



2) Navigate to Anomaly Detection/inference

```
PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy> ls


    Directory: C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         7/22/2025   8:41 PM                .ipynb_checkpoints
d-----         7/22/2025   8:35 PM                aws
d-----         7/22/2025   8:35 PM                code
d-----         7/22/2025   8:35 PM                data
d-----         7/22/2025   8:41 PM                papers
-a----         7/22/2025   8:35 PM            256 .gitignore
-a----         7/22/2025   8:35 PM          11558 LICENSE
-a----         7/22/2025   8:35 PM           9029 README.md


PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy> cd code
PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code> ls


    Directory: C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         7/22/2025   8:35 PM                Anomaly Detection


PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code> cd a*
PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code\Anomaly Detection> ls


    Directory: C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code\Anomaly Detection


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         7/22/2025   8:35 PM                blocks
d-----         7/22/2025   8:35 PM                Fine_Tune_Model
d-----         7/22/2025   8:40 PM                Inference
d-----         7/22/2025   8:35 PM                Plots
-a----         7/22/2025   8:35 PM        2405631 Astronomy_Overview.pptx
-a----         7/22/2025   8:35 PM           5407 NormalCell.py
-a----         7/22/2025   8:35 PM           2716 Plot_Redshift.py
-a----         7/22/2025   8:35 PM          11130 README.md


PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code\Anomaly Detection> cd In*
PS C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code\Anomaly Detection\Inference> ls


    Directory: C:\Users\darre\OneDrive\Desktop\School\grad\_Semester5\Data Eng\project\AI-for-Astronomy\code\Anomaly Detection\Inference
```

3) Update file paths in inference.py to match local env

Wasn't needed

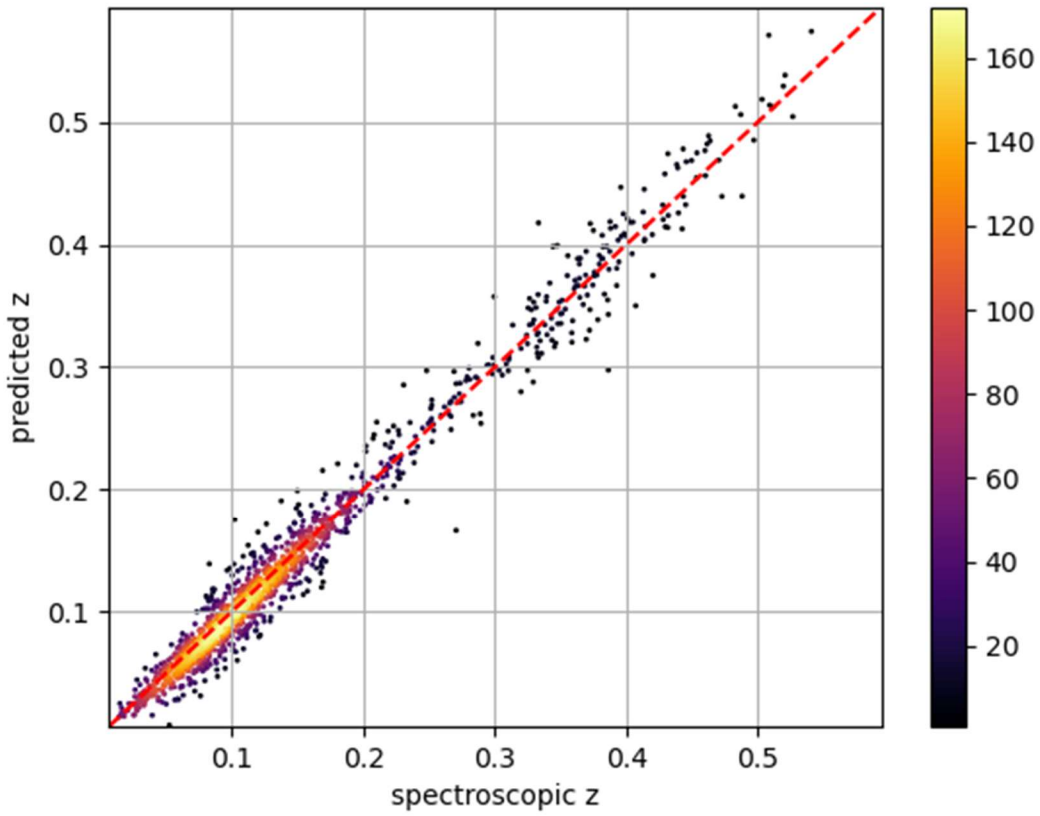
4) Run inference.py script and document execution time

The astronomy inference was successfully executed on a CPU-only machine using a batch size of 512 across 3 batches. The total CPU execution time was approximately 12.70 seconds, with an average per-batch time of 4.23 seconds. Peak CPU memory usage was ~25.3 GB, and throughput was measured at ~16.2 Mbps.

5) Capture output results
    a. Results.json

```
root
  total cpu time (second) 12.698254299999993
  total gpu time (second) 0
  execution time per batch (second) 4.232751433333331
  cpu memory (MB) 25336.653888
  gpu memory (MB) 0
  throughput(bps) 16198484.857875315
  batch size 512
  number of batches 3
  device "cpu"
  MAE 0.01251969638102928
  MSE 0.0002972779279695162
  Bias 0.0020244880761514164
  Precision 0.011360458992421626
  R2 0.9746744148433208
```


b. inference.png



6) Provide a brief analysis of the inference performance on your system
   The inference ran on a CPU-only system with a batch size of 512. It processed 3 batches in about 12.7 seconds total, averaging just over 4 seconds per batch. The memory usage was around 25 GB, which is a bit high, but expected for a large model. The predictions were very close to the actual values, with a low error rate and a high R^2 score of 0.97, meaning the model was very accurate. Overall, it performed well even without a GPU.
7) Document any errors encountered

   The only errors encountered were version errors for certain packages. Through trial and error, we were able to sort those out (pip uninstall … pip install…==x.x.xx)