

AI in Astrophysics and Space Exploration

Artificial Intelligence · Practice Test · 18 Questions

1. Which NASA mission used the 'Planet Hunters' citizen science project alongside convolutional neural networks to confirm the existence of Kepler-90i?

- A) Hubble Space Telescope
- B) Kepler Space Telescope
- C) James Webb Space Telescope
- D) TESS

2. The AEGIS (Autonomous Exploration for Gathering Increased Science) system is primarily used to control the camera instruments on which Mars rover?

- A) Perseverance
- B) Curiosity
- C) Opportunity
- D) Sojourner

3. In the context of the Gaia mission, what specific AI-driven technique is primarily used to process petabytes of data to determine the precise positions and motions of stars?

- A) Bayesian inference
- B) Gradient boosting
- C) Random forests
- D) Reinforcement learning

4. What is the primary function of the 'CIMON' (Crew Interactive Mobile Companion) AI system used on the International Space Station?

- A) Navigation control
- B) Structural monitoring
- C) Astronaut assistance
- D) Radiation shielding

5. Which machine learning algorithm was famously used by researchers to identify the 'Earth-sized' exoplanet K2-18b in existing Kepler mission data?

- A) Support Vector Machines
- B) Deep Neural Networks
- C) K-Nearest Neighbors
- D) Hidden Markov Models

6. The 'AutoNav' system, utilized by the Perseverance rover, performs what specific autonomous function during traverse operations?

- A) Fuel cell management
- B) Path planning and hazard avoidance
- C) Deep space telemetry relay
- D) Soil chemical composition analysis

7. What specific type of neural network architecture has been successfully applied to identify faint gravitational lensing signals in large-scale cosmic structure surveys?

- A) Generative Adversarial Networks
- B) Recurrent Neural Networks
- C) ResNet (Residual Networks)
- D) Boltzmann Machines

8. What is the primary challenge that the 'Artificial Intelligence for Space' (AI4Space) initiative aims to solve for satellite constellations?

- A) Collision avoidance
- B) Atmospheric re-entry
- C) Fuel propulsion optimization
- D) Interstellar communication

9. Which astronomical observatory utilizes AI-based 'real-time transient detection' to identify supernovae and other high-energy events in the night sky?

- A) Zwicky Transient Facility (ZTF)
- B) Chandra X-ray Observatory
- C) Very Large Array
- D) Spitzer Space Telescope

10. In the classification of galaxy morphologies, what tool was developed to automate the sorting process by mimicking human visual cortex processing?

- A) Galaxy Zoo's automated classification
- B) DeepGalaxy
- C) Morphology-CNN
- D) Cosmos-AI

11. The 'SHERLOC' instrument on the Perseverance rover uses an AI-integrated system to select targets for what purpose?

- A) Atmospheric pressure logging
- B) Mineralogical analysis
- C) Radioisotope heating
- D) Sub-surface water mapping

12. Which organization developed the 'Federated Learning' framework to improve privacy-preserving data analysis for distributed satellite networks?

- A) ESA
- B) NASA
- C) SpaceX
- D) JAXA

13. What is the primary computational method used by the 'Deep-sky' AI model to improve image resolution for ground-based telescopic observations?

- A) Super-resolution convolutional neural networks
- B) Linear regression modeling
- C) Decision tree clustering
- D) Principal component analysis

14. The 'Mars Helicopter' Ingenuity used a vision-based navigation system that relied on which fundamental AI technique to estimate its position relative to the surface?

- A) Natural Language Processing
- B) Optical flow estimation
- C) Sentiment analysis
- D) Genetic algorithms

15. Which specific deep learning approach is currently used to filter radio frequency interference from SETI (Search for Extraterrestrial Intelligence) signal data?

- A) Autoencoders
- B) Q-learning
- C) Support Vector Regression
- D) Naive Bayes

16. The 'AstroNet' model was designed to perform what specific task regarding exoplanet detection from light-curve data?

- A) Atmospheric composition analysis
- B) Binary classification of signals
- C) Orbital stability prediction
- D) Stellar mass estimation

17. Which AI-based method is commonly used to predict solar flares by analyzing the magnetic complexity of solar active regions?

- A) Long Short-Term Memory (LSTM) networks
- B) K-means clustering
- C) Simulated annealing
- D) Dynamic time warping

18. What is the main objective of the 'NASA Frontier Development Lab' (FDL) in the space sector?

- A) Developing rocket propulsion
- B) Applying AI to space exploration challenges
- C) Astronaut recruitment
- D) Space law lobbying