

# JONATHAN FRAINE

## Data Scientist and Data Analyst

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## EXPERIENCE

### Research Scientist

#### Space Science Institute

Nov 2018 – Current

- Data science (Machine Learning) consultancy for Public and Private Sectors
- Genetic algorithm, hyperparameter optimization w/ deep generative models.
- Improving quality assurance for the NASA Space Telescopes w/ deep learning
- Anomaly detection for several NASA Missions w/ machine & deep learning

### Research Scientist and Deputy Project Manager

#### Space Telescope Science Institute

Feb 2017 – Nov 2018

- Deputy project manager of the Exoplanet Characterization Toolkit (exoctk.stsci.edu).
- Created & lead the machine learning team for the James Webb Telescope.
- Designed deep learning platform for classification of Hubble Space Telescope images (w/ Tenorflow and Keras); poised to save 1000 person hours per year.
- Created random forest pipeline to identify anomalous pixels in infrared detectors (w/ Scikit-learn); improved operational efficiency by ~4x.
- Co-developed the contamination visibility tool back end (exoctk.stsci.edu/contam\_visibility).
- Co-developed Bayesian inference and correlated noise package (github.com/munozcar/skywalker)
- Co-developed instrument simulation software for exoplanet observations (github.com/spacetelescope/awesimsoss).
- Wrote > 15 unique documentation articles for community support (jwst-docs.stsci.edu).

### Postdoctoral Research Associate

#### University of Arizona

Sept 2015 – Feb 2017

- Wrote the Stage-2 information extraction pipeline for adv. infrared detectors.
- Disrupted how NASA research scientists identify anomalous infrared pixels.
- Taught information extraction and pipeline development to our team.

### Doctoral Research Associate

#### University of Maryland

Aug 2009 – Aug 2015

- Developed Bayesian inference analysis package for information extraction (github.com/exowanderer/wanderer)
- Published prestigious Nature publication: Water on a Small Exoplanet (nature.com/news/wet-exoplanet-has-clear-skies-1.15973).
- Predoctoral Fellowship at California Institute of Technology.
- Predoctoral Fellowship at Pontificia Universidad Catolica de Santiago.

### Selected Publications & Honors

#### United Nations

##### Economic and Social Commission of Western Asia Panelist (2019)

"Prospects of Innovation and Technology in Official Statistics" and  
"Use of Technology in Official Statistics: Ethical Considerations"

#### NATIONAL ACADEMY OF SCIENCES

##### Exoplanet Science Strategy Published Contribution

"Transiting Exoplanet Characterization Beyond 2030: A Case for  
Observing Giant Planets with Giant Telescopes" Fraine et al. 2018

#### NATURE PUBLICATION

##### Detection of Water Vapour on a Small Planet

"Water Vapour Absorption from the Clear Atmosphere of an  
Exo-Neptune" Fraine et al. 2014 Vol. 513, Issue 7519, pp. 526-529

## EDUCATION

### PhD in Astrophysics

#### University of Maryland

2015

### Predocctoral Fellowship

#### California Institute of Technology

2014

### Predocctoral Fellowship

#### Pontificia Universidad Católica - Chile 2013

### M.Sc. in Astrophysics

#### University of Maryland

2009 – 2011

### M.Sc. in Computational Mathematics

#### University of Central Florida

2007 – 2009

### B.Sc. in Physics & Astronomy

#### University of Central Florida

2003 – 2006

## SKILLS

Project Management

Artificial Intelligence

Public Speaking

Deep Learning

Deep Analytics

Machine Learning

Random Forests

SVMs

Statistical Analysis

Bayesian Inference

Data Collection

Data Mining

Generative Modeling

Regression

Classification

Clustering

## TOOLS

TensorFlow, Keras, Scikit-learn, Git, AWS

## ANALYTICAL METHODS

Bayesian Inference, Predictive Analytics,  
Time Series Analysis, Machine Learning,  
Signal Processing, Simulation

## DOMAIN KNOWLEDGE

Remote Sensing, Astrophysics,  
Atmospheric Physics, Bayesian statistics,  
Infrared Detectors

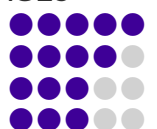
## PROGRAMMING LANGUAGES

Python,  $\text{\LaTeX}$

C/C++. Unix

Matlab, IDL

HTML, JavaScript, SQL



## LANGUAGES

English

Arabic

Spanish

