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# **Nuclei Documentation**

***Release***

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Nuclei is a library for the 2018 Kaggle Data Science Bowl.



# CHAPTER 1

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## Introduction

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Spot Nuclei. Speed Cures.

Imagine speeding up research for almost every disease, from lung cancer and heart disease to rare disorders. The 2018 Data Science Bowl offers our most ambitious mission yet: create an algorithm to automate nucleus detection.

We've all seen people suffer from diseases like cancer, heart disease, chronic obstructive pulmonary disease, Alzheimer's, and diabetes. Many have seen their loved ones pass away. Think how many lives would be transformed if cures came faster.

By automating nucleus detection, you could help unlock cures faster—from rare disorders to the common cold. Why nuclei?

Identifying the cells' nuclei is the starting point for most analyses because most of the human body's 30 trillion cells contain a nucleus full of DNA, the genetic code that programs each cell. Identifying nuclei allows researchers to identify each individual cell in a sample, and by measuring how cells react to various treatments, the researcher can understand the underlying biological processes at work.

By participating, teams will work to automate the process of identifying nuclei, which will allow for more efficient drug testing, shortening the 10 years it takes for each new drug to come to market. What will participants do?

Teams will create a computer model that can identify a range of nuclei across varied conditions. By observing patterns, asking questions, and building a model, participants will have a chance to push state-of-the-art technology farther.

Visit [DataScienceBowl.com](https://DataScienceBowl.com) to:

- Sign up to receive news about the competition
- Learn about the history of the Data Science Bowl and past competitions
- Read our latest insights on emerging analytics techniques

## Spot Nuclei. Speed Cures.

The challenge: Create an algorithm to automate nucleus detection

**40%**

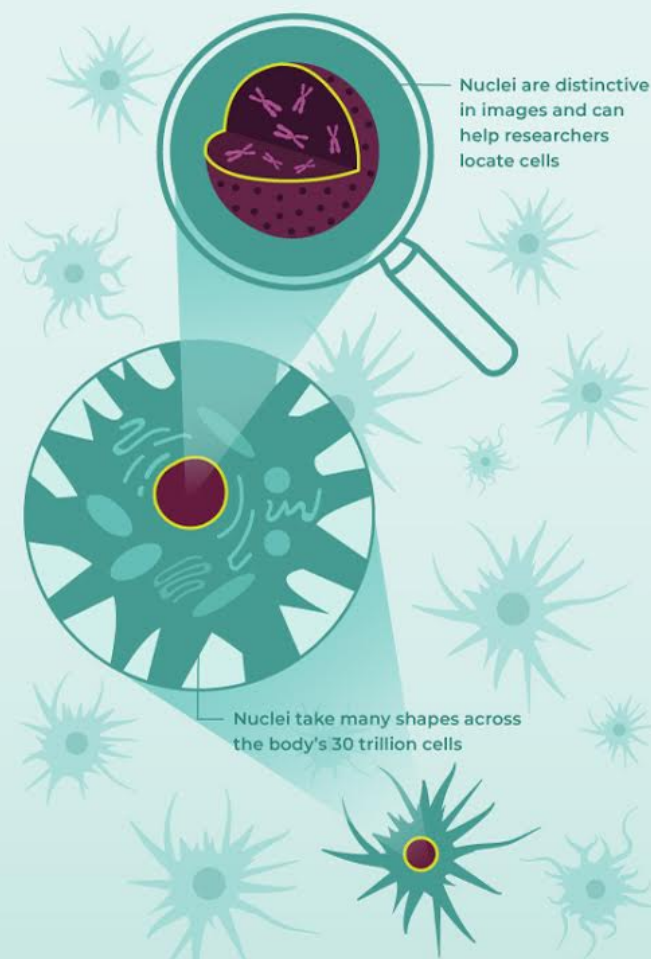
of all deaths are caused by illnesses like heart disease and cancer<sup>1</sup>

**75%**

of rare diseases affect children<sup>2</sup>

**30%**

of affected children with rare diseases die before age 5<sup>2</sup>



Finding the nucleus helps to...



locate cells in varied conditions to enable faster cures



free biologists to focus on solutions



improve throughput for research and insight



reduce time-to-market for new drugs— currently 10 years



increase # of compounds for experiments



improve health and increase quality of life

**SOURCES:** <sup>1</sup>Heart disease and cancer causing 40% of all deaths – World Health Organization (WHO). 2015 – 56.4 million deaths. <http://www.who.int/mediacentre/factsheets/fs310/en/>  
2015 – 17.7 deaths from cardiovascular diseases (CVDs). <http://www.who.int/mediacentre/factsheets/fs317/en/>  
2015 – 8.8 million deaths from cancer. <http://www.who.int/mediacentre/factsheets/fs297/en/>

<sup>2</sup>Childhood diseases – 75% of rare diseases affect children; 30% die before age 5 – European Society of Paediatric Oncology (SIOPe). <http://www.siope.eu/SIOPE-EU/English/SIOPE-EU/Advocacy-Activities/Rare-Diseases/page.aspx/148>



### 2.1 Stable release

To install nuclei, run this command in your terminal:

```
pip install nuclei
```

This is the preferred method to install molecules, as it will always install the most recent stable release.

If you don't have [pip](#) installed, this [Python installation guide](#) can guide you through the process.

### 2.2 From sources

The sources for molecules can be downloaded from the [Github repo](#).

You can either clone the public repository:

```
git clone git://github.com/yngtodd/nuclei
```

Or download the [tarball](#):

```
curl -OL https://github.com/yngtodd/nuclei/tarball/master
```

Once you have a copy of the source, you can install it with:

```
python setup.py install
```



## CHAPTER 3

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### Usage

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To use molecules in a project:

```
import nuclei
```



A collection of references and reading materials.

#### 4.1 Related Work

1. **2017 Data Science Bowl Winning Solution:** <https://github.com/lfz/DSB2017> A Pytorch model for image segmentation of lung images.

#### 4.2 Papers

#### 4.3 Blogs and Wikis



### 5.1 Development Team

- **Todd Young:**

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### 5.2 Contributors

None yet. Why not be the first?





#### 6.1 0.1.0 (2018-01-18)

- First release on PyPI.



## CHAPTER 7

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And now for something completely different. . .

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## CHAPTER 8

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### Indices and tables

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- `genindex`
- `modindex`
- `search`