# Keras

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**Keras** is an open-source neural-network library written in Python. It is capable of running on top of TensorFlow, Microsoft Cog[illegible] Toolkit, R, Theano, or PlaidML.[2][3][4] Designed to enable fa[illegible] experimentation with deep neural networks, it focuses on be[illegible] user-friendly, modular, and extensible. It was developed as [illegible] the research effort of project ONEIROS (Open-ended Neuro[illegible] Electronic Intelligent Robot Operating System),[5] and its pri[illegible] author and maintainer is François Chollet, a Google engine[illegible] Chollet also is the author of the XCeption deep neural netw[illegible] model.[6]

In 2017, Google's TensorFlow team decided to support Keras in TensorFlow's core library.[7] Chollet explained that Keras was conceived to be an interface rather than a standalone machine learning framework. It offers a higher-level, more intuitive set of abstractions that make it easy to develop deep learning models regardless of the computational backend used.[8] Microsoft added a CNTK backend to Keras as well, available as of CNTK v2.0.[9][10]

**Keras**

| | |
|---|---|
| **Developer(s)** | various |
| **Initial release** | 27 March 2015; 5 years ago |
| **Stable release** | 2.4.0[1] / 17 June 2020; 47 days ago |
| **Repository** | github.com/keras-team/keras |
| **Written in** | Python |
| **Platform** | Cross-platform |
| **Type** | Neural networks |
| **License** | MIT |
| **Website** | keras.io |

**Python** is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim

**Contents** [hide]



## Features [edit]

Keras contains numerous implementations of commonly used neural-network building blocks such as layers, objectives, activation functions, optimizers, and a host of tools to make working with image and text data easier to simplify the coding necessary for writing deep neural network code. The code is hosted on GitHub, and community support forums include the GitHub issues page, and a Slack channel.

In addition to standard neural networks, Keras has support for convolutional and recurrent neural networks. It supports other common utility layers like dropout, batch normalization, and pooling.[11]

Keras allows users to productize deep models on smartphones (iOS and Android), on the web, or on the Java Virtual Machine.[3] It also allows use of distributed training of deep-learning models on clusters of Graphics processing units (GPU) and tensor processing units (TPU) principally in conjunction with CUDA.[12]

## Traction [edit]

Keras claims over 250,000 individual users as of mid-2018.[3] Keras was the 10th most cited tool in the KDnuggets 2018 software poll and registered a 22% usage.[13]

## See also [edit]

- Comparison of deep-learning software

## References [edit]

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3. ^ [a] [b] [c] "Why use Keras?" . *keras.io*. Retrieved 2020-03-22.
4. ^ "R interface to Keras" . *keras.rstudio.com*. Retrieved 2020-03-22.

4. ^ "Introduction to Keras" . www.rstudio.com. Retrieved 2020-06-22.
5. ^ "Keras Documentation" . *keras.io*. Retrieved 2016-09-18.
6. ^ Chollet, François (2016). "Xception: Deep Learning with Depthwise Separable Convolutions". arXiv:1610.02357 .
7. ^ "Module: tf.keras | TensorFlow" . *TensorFlow*. Retrieved 2018-11-14.
8. ^ Chollet GitHub Comment
9. ^ CNTK Keras GitHub Issue
10. ^ alexeyo. "CNTK_2_0_Release_Notes" . *docs.microsoft.com*. Retrieved 2017-06-14.
11. ^ "Core - Keras Documentation" . *keras.io*. Retrieved 2018-11-14.
12. ^ "Using TPUs | TensorFlow" . *TensorFlow*. Retrieved 2018-11-14.
13. ^ Piatetsky, Gregory. "Python eats away at R: Top Software for Analytics, Data Science, Machine Learning in 2018: Trends and Analysis" . *KDnuggets*. KDnuggets. Retrieved 30 May 2018.

## Further reading [edit]


- Chollet, François; Allaire, J. J. (2018). *Deep Learning with R*. Manning. ISBN 978-1-61729-554-6.


## External links [edit]

- Official website

| v · t · e | **Deep learning software** | [hide] |
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| **Proprietary** | Maple · Neural Designer · Wolfram Mathematica · Apple Core ML | |
| **Category · Comparison** | | |

Categories: Applied machine learning | Data mining and machine learning software | Deep learning | Free statistical software | Python scientific libraries | Software using the MIT license