mlpack is a fast, flexible machine learning library that is written in C++ and built on the Armadillo linear algebra library and the ensmallen numerical optimization library. The project aims to provide fast, extensible implementations of cutting-edge machine learning algorithms to users using the C++ API, or via a number of popular languages (Python, Julia, R, Go) and the command-line interface (CLI).

**USE CASES**

**Telecommunications and Astrophysics:**
- **RLNN:** A software developed by NASA that uses mlpack to implement a cognitive communication engine. It aims to improve communications with satellites and the ISS. The software has been integrated with the space-ground system (SCaN) located at NASA Glenn Research Center.
- **AperC4:** An algorithm that uses mlpack to find galaxy clusters using non-parametric methods applied to catalogs of galaxies generated from multi-colour CCD observations.

**Robotics / Biomedical:**
- **MagicFlock:** A robotic framework dedicated to drone swarms that allows users to fly drones inside a simulator. It uses the mlpack library to provide predictive and reactive models for drones to achieve the swarming behavior.
- **iMOKA:** A biomedical software that uses mlpack to enable the analysis of sequencing data to generate robust classification models or explore specific genetic elements associated with disease etiology.
- **Vespucci:** An image analysis software that uses mlpack to perform data-processing operations, such as filtering, normalization, baseline correction. The software is capable of analyzing spectroscopic images, X-ray diffraction, in addition to surface-enhanced Raman spectroscopies.

**PLANNED FEATURES**

- Optimize mlpack for lightweight installation and deployment, reducing compile times and dependency overhead for use cases including embedded and low-resource applications.
- Provide initial GPU support for mlpack via the Bandicoot project: This will enable mlpack algorithms to train models on GPU machines and provide diverse deep learning functionalities.
- Improve the accessibility and discoverability of mlpack’s documentation and tutorials, to ease onboarding for new users.
- Add support and utilities for handling non-numeric data (image data, text data, etc.)

**PROJECT STATISTICS:**
- Github stars (3800+)
- Forks (1400+)
- Number of contributors (200+)
- Years active (13+)
- Citations (240+)
# PROJECT NEEDS

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Dev Time</th>
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</thead>
<tbody>
<tr>
<td>Enabling initial GPU support</td>
<td>1 year</td>
</tr>
<tr>
<td>Technical writer / content creator</td>
<td>6 months</td>
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<tr>
<td>Revamping documentation</td>
<td>6 months</td>
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<tr>
<td>Integration support with other toolkits, languages, and environments</td>
<td>6 months</td>
</tr>
<tr>
<td>Optimize mlpack’s algorithms for speed and memory usage</td>
<td>1+ years</td>
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For more information on mlpack, including our governance structure and project roadmap, please visit https://www.mlpack.org/

For more information: info@numfocus.org | +1 (512) 831-2870.