FeatureCloud

FeatureCloud: The new privacy-preserving platform for federated machine learning in healthcare is ready

"featurecloud.ai" enables biomedical researchers to build machine learning models and collaborate without sharing primary data – cost-free, privacy-preserving, secure

- **FeatureCloud** (featurecloud.ai) is a novel **artificial intelligence** (AI) platform that uses a federated infrastructure to locally execute AI applications (apps) behind the safe firewalls of hospitals or institutes. Only locally learned model parameters are shared with collaborators via the internet.
- **For patients**, this federated approach makes FeatureCloud **privacy-preserving** by default because no personal or primary medical data needs to be transferred via any communication channel.
- **For biomedical researchers**, FeatureCloud opens a world of unrestricted and secure research as machine learning models can be built based on big data from multiple institutions, thereby accelerating scientific insight and treatment development worldwide.
- **For developers**, FeatureCloud offers app templates, workflow management, documentation, and testing tools. External developers are cordially invited to contribute their own innovative apps. The FeatureCloud team certifies that new apps meet all security- and privacy-requirements.
- **All FeatureCloud apps are free of charge**, while external developers may charge fees for their apps. Over 60 primarily biomedical apps already exist in the FeatureCloud App Store.
- FeatureCloud is an **EU-funded Horizon 2020 project** with eight consortium partners across Europe.
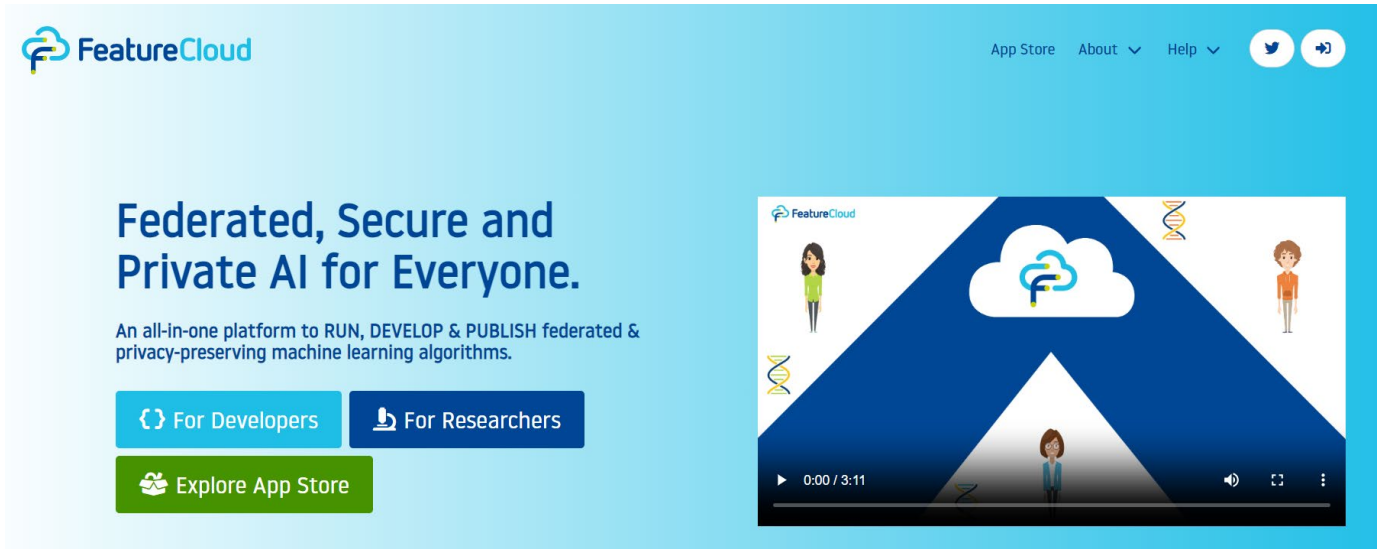
The Accomplishment

FeatureCloud makes it possible: A future in which doctors can easily and safely use primary medical data for research purposes, scientists have global access to research findings in order to better understand diseases and accelerate the development of novel treatments, while patients maintain full control over how much information they want to share or keep private. To find a legally and technically secure solution for these seemingly conflicting objectives, the FeatureCloud platform uses an innovative novel approach: (1) All potentially insecure data communication happens decentralized behind the firewalls of local hospitals or research institutes (highest-possible security, no single point of attack), (2) any analysis of primary data takes place locally by decentralized AI applications behind these firewalls, and (3) only machine learning models or outcome parameters that cannot be traced back to individual input data points or sensitive patient data are transferred to a centralized, yet transient cloud.

"FeatureCloud is the unique chance to make medicine big data ready without compromising patient privacy."
Prof. Jan Baumbach

The App Store

It is ready: Everyone can visit the FeatureCloud App Store and use the customised biomedical data analysis apps. A project video and two tutorial videos explain how to use existing apps and how to develop and test novel FeatureCloud apps, while three in-depth video-interviews explain the scientific motivation and technical set-up. The most attractive characteristic of the platform is its all-in-one design. It unites intuitive project management with user-friendly apps that represent intricate machine learning algorithms, makes it easy to assemble analysis pipelines for datasets residing at different geographic locations, and allows external developers to contribute their own machine learning apps to the App Store. Once a new app has been tested and published, it has to be certified by the FeatureCloud team to ensure its functionality, security, and privacy-compliance. FeatureCloud thereby aims to become a trustworthy ecosystem for developers and end-users of federated algorithms.

Entrance to the FeatureCloud App Store on featurecloud.ai. Create your own account and explore!

The Team

Spearheaded by Prof. Dr. Jan Baumbach from Universität Hamburg, the App Store for healthcare is the keystone product of the EU-funded FeatureCloud project (featurecloud.eu). The 5-year long Horizon 2020 project received 4.6 million Euros, also investigated legal and ethical aspects of federated AI-training in medicine, and concludes in December 2023. These are the consortium partners:

1. Universität Hamburg, Hamburg, Germany (coordinating institution)
2. concentris research management gmbh, Fürstenfeldbruck, Germany
3. Gnome Design SRL, Sfântu Gheorghe, Romania
4. Medizinische Universität Graz, Graz, Austria
5. Philipps Universität Marburg, Marburg, Germany
6. Research Institute AG & Co KG, Vienna, Austria
7. SBA Research Gemeinnützige GmbH, Vienna, Austria
8. Syddansk Universitet, Odense, Denmark

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Funding