From Bias to Balance

TANGO's Open-Source Hybrid-Intelligence Platform

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TANGO

“It takes two to tango”

Keeping Humans in the Loop with Open Source AI through a modular Python stack to build a transparent, fair and collaborative human-machine decision making

EU Funding, program Horizon Europe

Call A HUMAN-CENTRED AND ETHICAL DEVELOPMENT OF DIGITAL AND INDUSTRIAL TECHNOLOGIES

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Who's in charge?

In critical domains—healthcare, finance, policy—AI offers incredible power.

But when an algorithm recommends a life-or-death decision, who is truly accountable?

- How do we trust the machine's recommendation?
- How do we ensure it's fair and unbiased?
- How do we intervene when our expertise tells us something is wrong?

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TANGO: “Both are in charge. By design.”

- **What it is**: TANGO is an EU-funded research project to build a platform for shared human-machine decision authority.
- **The Team**: Developed by a consortium of 21 participants.
- **The Philosophy**: We believe transparency, fairness and human feedback are not features, but the fundamental core of trustworthy AI.
- **The License**: Everything we build is Apache 2.0. We are open by default.

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The Three Pillars of Trustworthy AI

Fairness & Ethics Core

Auditable bias-detection and mitigation pipelines. It logs every rule check for full transparency.

Explain-for-Whom Layer

Context-aware explanations. Generate different explanations for different audiences: an expert clinician, a citizen or a regulator.

Hybrid-Learning API

A REST interface that injects human feedback directly into the loop to enhance models, live in production.

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The Three Pillars of the TANGO Ecosystem

TANGO Library

Collection of algorithms and methods on synergistic human-machine learning and hybrid decision making, released as open source for researchers and innovators.

TANGO Platform

Hosts ML and decision support models, managed by a microservice architecture and integrating external MLOps platforms providing computational resources.

TANGO API

Multi-purpose REST API to manage authorization and expose platform's features, supporting users and the case studies.

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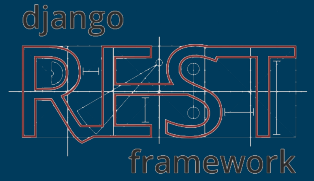
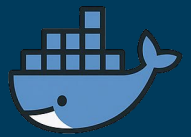
Built with Open Source, for Open Source





- Core Language: **Python**
  clean, versatile and widely used in data science
- API Layer: **Django REST Framework**
  modern, high-performance REST APIs with validation and authentication
- Inter-Service Communication: **gRPC**
  fast, type-safe communication between distributed components
- Persistence: **PostgreSQL**
  reliable, feature-rich relational database for structured data storage
- Workflow Orchestration: **Apache Airflow**
  robust scheduling and management of complex data pipelines
- Containerization: **Docker & Docker Compose**
  consistent, reproducible deployments across environments
- MLOps: **Pluggable architecture**
  currently supporting Databricks and MLFlow
- Community & CI/CD: **GitLab**
  collaborative development and built-in CI

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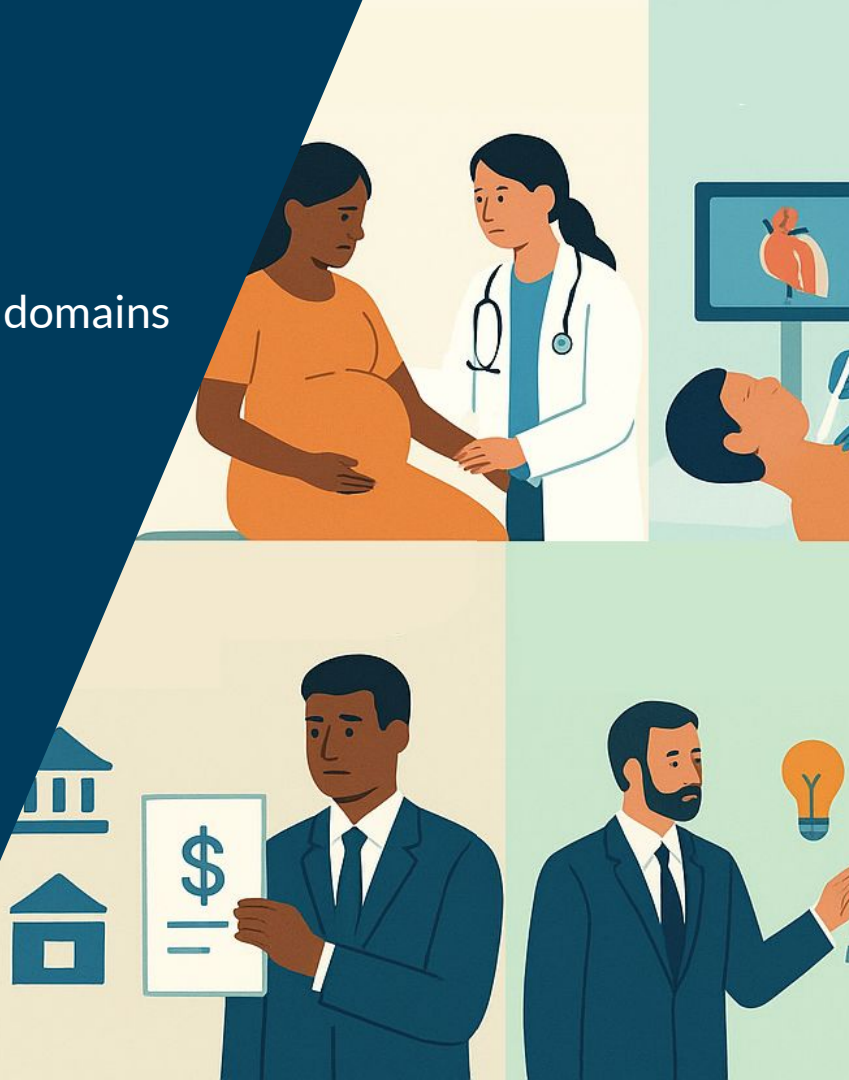
From Theory to Production

TANGO is already powering pilots in high-impact domains

- Maternal-Care Triage (Healthcare)
  Cutting diagnostic delays for high-risk pregnancies
- Pre-operative Guidance (Healthcare)
  Assisting surgeons during aortic aneurysm treatments
- Credit Allocation (Finance)
  Flagging/mitigating discriminatory lending practices
- Scenario Building (Policy)
  Helping policymakers understand
  the impact of their decisions



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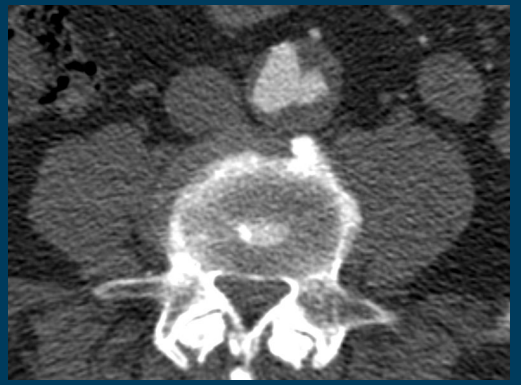
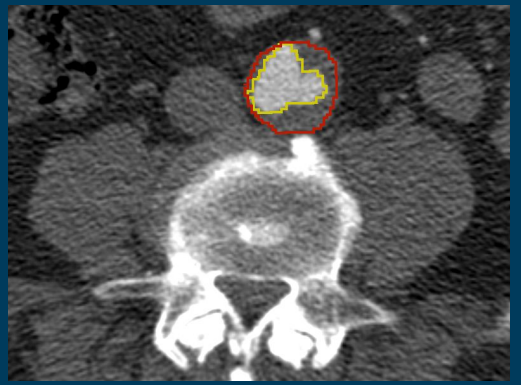
Thrombus and aneurysm detection

- AI model for rapid, automated segmentation of the aorta from CT scans.
- The model robustly identifies the true aortic wall, even in the presence of thrombus (blood clots) or aneurysms.
- This precise segmentation provides surgeons with critical measurements for accurate pre-operative planning and device sizing.
- This model represents the first step in a larger pipeline where AI and surgeons interact to enhance AI predictions and surgical actions





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TANGO

Let’s demo

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Let's query a Trustworthy AI

Demo: Interact with TANGO API

- Live calls to the **TANGO REST API**
- Model: example wine classifier
  the same flow applies to any model hosted on the platform
- Prediction: the TANGO-hosted model predicts wine classes on input dataset
- Explanation: a XAI tool explains the prediction, identifying the most important features

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TANGO is Yours to Fork, Probe and Improve

- Get the Code: All modules, Docker images and utilities are on GitLab
  https://gitlab.com/groups/tango-ecosystem
- Read the Docs: Step-by-step guides to get you started
  http://docs.tango.u-hopper.com
- Apache 2.0 License
  Use it in your commercial or personal projects

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Thank You & Q&A

- **Our Goal:** TANGO builds trust by design, not as an afterthought.
- **Hybrid-Intelligence:** We believe the future is collaborative, keeping humans in the loop.
- **Open by Default:** Everything you saw is open-source. We invite you to build with us.

🤝 Get in Touch: To learn more or collaborate, email us at tango@afliant.com

🙏 Thank You

Any questions ❓

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