Spoke 2- Cascade Call for PMI

Allocated funds total: € 903.351,06
Allocated funds South: € 90.335,11

Objective #1: Integrative Artificial intelligence for crop Data Analysis and environmental impact assessment

Allocated funds: € 95.**648**,94

Funding Type: Feasibility Studies

Description of the objective: The objective is to develop an integrative artificial intelligence system that can analyze data from agricultural crops and assess their environmental impact. The system will use machine learning and domain modeling techniques to analyze data from various sources, by creating models of the agricultural system and its environmental impact. Additionally, the call wants to investigate explainable AI techniques to provide transparency and interpretability of the results. The machine learning techniques will be used to identify patterns in the data and make predictions about crop yields and their environmental impact, enriched by modeling the agricultural system. To interact with the data analytics system, a generative AI-based conversational interface using Large Language Models has to be designed and prototyped.

Objective #2: Co-creating Artificial Intelligence techniques for multi-dimensional temporal data analysis

Allocated funds: € 95.648,94

Funding Type: Feasibility Studies

Description of the objective: Temporal annotated data (hereafter execution traces) are extremely important in real scenarios and can be found in a plethora of environments ranging from the execution of e.g., Industrial Processes, Administration Procedures, Standard Operational Procedures, and Medical Guidelines. These data are often characterized by an articulated and multidimensional structure, having a temporal flavor and several data-oriented structural constraints. Artificial Intelligence (AI) techniques are increasingly applied to analyze and exploit such data to provide decisional support to the owners of the processes/procedures they execute. These techniques range from data/process mining, formal reasoning, and verification to predictive and prescriptive analytics. They have the potential to complement and integrate well with non-AI techniques such as simulation, operational research, and business intelligence, which are traditionally applied to manipulate these data. One of the challenges in this field is to combine AI techniques with traditional non-AI techniques used to manipulate and exploit execution traces to provide insights and decisional power to the user. An example is the combined usage of prediction/generation and simulation techniques to investigate the likely behavior of a process and the possible use of techniques to improve the process itself. This call has the objective of identifying novel use cases for the usage of a combination of AI and non-AI techniques in real domains described by temporal annotated date. Emphasis will be given to the following aspects: (a) the complexity of the data/scenario at hand; (b) the need of +the combination of different techniques in a realistic pipeline. The call also has the objective of strengthening the collaboration between research and companies in the field.

Objective #3: Integrative AI for Medicine
Allocated funds: € 106.276,60
Funding Type: Industrial Research and Experimental development, where the ratio of Experimental Development w.r.t the whole project is not lower than 43%
Description of the objective: The objective of this call is the development of prototypes based on the concept of integrative AI for applications in the medical field. A specific domain (e.g., radiology, neurology, pathological anatomy, etc.) must be considered, within which a specific problem to be addressed with integrative AI techniques should be defined. Proposals should include the creation of a prototype and its validation in real-world scenarios along three layers of integrations: modeling, reasoning, and deliberation; interaction with the environment, including humans; cooperation among multiple artificial and human agents.
Objective #4: Foundation models for automatic document analysis
Allocated funds: € 106.276,60
Funding Type: Industrial Research and Experimental development, where the ratio of Experimental Development w.r.t the whole project is not lower than 43%
Description of the objective: The objective is to leverage advanced foundation models for document analysis in order to enhance information extraction and document understanding capabilities. The focus will be on developing a robust and versatile model that can accurately comprehend and categorize diverse types of documents, ranging from structured reports to unstructured textual content. The project aims to explore the application of state-of-the-art natural language processing (NLP) and Computer Vision (CV) techniques to automatically extract key information, identify patterns, and summarize document content efficiently. Additionally, the call wants to investigate methods to improve the model's adaptability to domain-specific jargon and terminology, ensuring its versatility across various industries. The potential outcomes include the development of a powerful foundation model that can significantly streamline document processing workflows, leading to increased efficiency and accuracy in information retrieval for a wide range of applications, such as legal document analysis, financial reports, and medical records.

Objective #5: Integrative AI for Intelligent Query Answering
Allocated funds: € 95.648,94
Funding Type: feasibility studies
Description of the objective: This call focuses on AI methods that make the execution of queries on structured data sources more efficient, with particular focus on approaches combining symbolic reasoning on structured queries (e.g., query rewriting) and sub-symbolic inference and learning on the data of the structured data source (e.g., computation and optimization in an embedded latent space of the data). Proposals should identify a specific problem and a concrete solution. The following can be considered as an example of activities: Given a symbolic query Q (e.g., an SQL, or a Graph Query), that needs to be evaluated in a structured data source S (e.g., knowledge graph, relational database,…) we are interested in developing Artificial Intelligence (AI) methods that estimate the portion of data S' of S that is relevant to the query Q so that Q(S') is a good approximation of Q(S) and can be executed more efficiently.
Objective #6: AI technologies for multilingual communication
Allocated funds: € 106.276,60
Funding Type: Industrial Research and Experimental development, where the ratio of Experimental Development w.r.t the whole project is not lower than 43%
Description of the objective: The state of the art in automatic text/speech-to-text translation and text/speech-to-speech technology, coupled with the generative capabilities of foundation models, has reached a level of maturity that offers unprecedented opportunities for both disruptive research and direct industrial exploitation. These opportunities range from the integration of advanced models into systems at the production level to the exploration of cutting-edge solutions for next-generation communication systems. Innovations along these two dimensions are expected to impact various levels, including streamlining industrial processes (e.g. to reduce human and computation costs) and deploying next-generation multilingual systems for natural human-human and human-machine communication, as well as for content production, access, and presentation. Driven by these ambitions, the investments target a broad range of cutting-edge market-oriented solutions. Objectives of this call include (but are not limited to): dubbing and subtitling audiovisual content; the seamless integration of AI components for text, speech, and video processing in communication environments; the evaluation and early detection of system faults; the rapid injection of new/private knowledge; information privacy protection; model compression and efficiency.

Objective #7 Integrative AI for Geo-Intelligence
Allocated funds: € 106.276,60
Funding Type: Industrial Research and Experimental development, where the ratio of Experimental Development w.r.t. the whole project is not lower than 43%
Description of the objective: By geo-intelligence we refer to the integration of AI in geospatial representations, analyses, and decision-making, using data coming from remote sensing and global positioning system technologies, ground sensors and any other dataset associated with a particular location. The objective of this call is to develop an integrative AI system that can integrate different geospatial technologies, analyze (static or dynamic, 2D or 3D) data about a given territory, integrate satellite, aerial and terrestrial images of a given area and create links with other available structured data, including administrative data and urban data spaces. Proposals should include the integration of AI solutions with spatial data analysis algorithms. The integration should take into account the vast amount of available heterogeneous geodata, from images at various levels of detail to vector information, with the possibility of recognizing buildings, roads or parked cars, create 3D dynamic environments, predict urban heat islands or crop yields, etc. The project should aim at creating solutions for urban concerns, supporting the green deal actions, but also in response to possible natural hazards. Structured data from public institutions, such as health reports, pollution measurements or temperatures, should also be considered and integrated by such solutions.
Objective #8: Integrative AI for Story Telling
Allocated funds: € 95.648,94
Funding Type: feasibility studies
Description of the objective: The objective of the project is to create AI-generated content that has the potential to build new and diverse stories and that could help artists and game developers in their creative work. Integrative AI methodologies and techniques should address the problem of analyzing data on different text genres, character archetypes, and plot structures to propose stories and games reflecting different situations and experiences. The project should aim at the development of an AI story-writing tool that can provide creative input and inspiration, e.g., for game designers, writers, set designers, screen writers, film directors who need a boost in generating ideas for their stories. The tool could cover different aspects of the writing experience, from suggesting scenarios to sketching characters and drafting dialogues in scripts.

Objective #9: AI for Energy Aware Distributed Workloads in the Could-Edge Continuum
Allocated funds: € 95.648,94
Funding Type: feasibility studies
Description of the objective: The objective of this call is to develop and test Data and AI Engineering software components facilitating intelligent workloads and cross-optimization of digital footprint and executional constraints. The focus is on addressing specific resource and energy optimization challenges for the next generation of cloud-native software. The call emphasizes the development of decentralized Integrative AI components, which play a crucial role in supporting complex, heterogeneous Data and AI Engineering platform patterns for multi-domain, many-to-many cloud-native applications. The ultimate aim is to foster dynamic workload portability, achieving optimal resource allocation and digital footprint optimization. These components are critical to provide the link between the next generation Cloud-Edge Continuum and next generation decentralized, data intensive applications, thus enabling a "full stack" Cloud-Edge-Data Processing Continuum.

Proposed Evaluation Criteria for all the projects:

- Quality of the project:
  - Innovation, methodologies, organization, previous experience
  - Clarity of the proposal and relevance to the objectives of the call.
  - Expertise of the proposers
  - Quality and clarity of the expected collaboration with the WP research entities (i.e., FBK and UniTN)
- Management of the project and evaluation pipeline:
  - Structure of the team of proposers and relevance with the activities to be performed in the project.
  - Proposed results and quality of the KPI used for the monitoring of activities.