



H.F.R.I.
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Research & Innovation

Description of the funded research project
1st Call for H.F.R.I. Research Projects to Support Faculty
Members & Researchers and Procure High-Value
Research Equipment

Title of the research project: A Toolkit for the Analysis and Synthesis of Soundscapes

Principal Investigator: Assistant Professor Aggelos Pikrakis, Eng., Ph.D.

Reader-friendly title: SOUNDSCAPES

Scientific Area: Mathematics and Information Sciences

Institution and Country: University of Piraeus, Greece

Host Institution: University of Piraeus

Collaborating Institution(s): -

Project webpage: soundscapes.unipi.gr

Budget: 169758.60 euro

Duration: 24 months

Research Project Synopsis

The aim of the SOUNDSCAPES project is to develop tools for the design and production of *sound scenes, sound effects and ambiences*, allowing for the generation of evolving, interactive and dynamically adjustable sound scenes of arbitrary length. Consequently, the SOUNDSCAPES approach supports audio design and editing and facilitates solutions for audio productions by offering automations and abstractions for the integration in widely used audio processing and synthesis platforms. SOUNDSCAPES targets a wide range of creative industry sectors, enabling both professional sound designers and less experienced users to produce high-quality soundscapes enhanced with dynamic features. Therefore, SOUNDSCAPES can allow for efficient, granulated, and concept-based retrieval and management of audio scenes and their components.

Project originality

The project aims at advancing the state-of-the-art by designing algorithms that break uninterrupted audio streams into sound scenes, detect with high precision and recall salient audio events within the discovered sound scenes, classify background textures and, ultimately, infer the complete timeline of an audio stream. The automatically extracted timelines will be subsequently used as training data by synthesis algorithms which will be able to generate dynamically evolving soundscapes of arbitrary length. This approach will eventually make it feasible a) to automatically analyze weakly labeled and even completely unlabeled data which are nowadays abundant in massive, publicly available collections, and b) train deep, data demanding, models for the generation of convincing soundscapes.

Expected results & Research Project Impact

SOUNDSCAPES aims at providing a research prototype that will demonstrate novel aspects of sound scene analysis and synthesis algorithms. Emphasis will be given on deep learning approaches for the problems of acoustic scene segmentation, acoustic scene classification audio event detection and time-line modelling. Furthermore, novel techniques for machine learning-based sound synthesis will be investigated and assessed. The project outcomes target various sectors of the creative industries and especially sectors where audio analysis and synthesis needs demand for low budget solutions that can produce evolving sound scenes of arbitrary length. Such sectors include, but are not limited to gaming, audiobooks, movie editing and the advertising industry.

The importance of this funding

H.F.R.I. funding is of paramount importance for the creation, maintenance and reinforcement of our research team and provides crucial resources that enable the design and development of advanced machine learning technologies that can deliver research results beyond the state-of-the-art in the exciting fields of auditory scene analysis and synthesis. The provided funding therefore enables the principal investigator of this project to pursue a research track that has long been a vision of his and assemble a team of both new and more experienced researches that can contribute to making this vision a reality.



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COMMUNICATION

185 Syggrou Ave. & 2 Sardeon St. 2
171 21, N. Smyrni, Greece
+30 210 64 12 410, 420
communication@elidek.gr
www.elidek.gr