ACMUS - ADVANCING COMPUTATIONAL MUSICOLOGY: SEMI-SUPERVISED AND UNSUPERVISED SEGMENTATION AND ANNOTATION OF MUSICAL COLLECTIONS

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EXTENDED ABSTRACT

ACMus is a research project that aims to develop tools for musicological analysis that minimally rely on the availability of large amounts of annotated data. There are many scenarios where annotated data can be scarce or difficult to obtain. In some cases, the music data itself is simply scarce. Imagine for example, the musical traditions of the Emberá people, indigenous to Colombia and Panama. Even though recordings do exist, the amount of data available is simply not large. In other cases, the limiting factor is not the availability of music data but the considerable amount of domain knowledge required to perform the annotations. This is the case, for example, of the music of the Andes region in Colombia: numerous recordings are available but not necessarily the capacity within the local experts to produce large amounts of annotations. With this scenarios in mind, the work conducted within the ACMus project focuses on **semi-supervised and unsupervised** methods for music information retrieval (MIR). As the main use-case of this research, ACMus focuses on the analysis of music from the Andes region of **Colombia**.

Following recommendations in [2], the end goal of ACMus is to develop tools that are not only reliable but also accessible to a wider community including musicologists, ethnomusicologists, archivist, and MIR researchers. For this reason, our team is a multi-discilpinary collaboration between the Semantic Music Technologies Group at Fraunhofer IDMT (Germany), the Institute for Media Technology at Technische Universität Ilmenau (Germany), the Músicas Regionales Group at Universidad de Antioquia (Colombia), and the GIDATIC research group at Universidad Pontifícia Bolivariana (Colombia).

The four main areas of research in ACMus the following:

1. **Instrumental Format Recognition**: we aim to develop methods capable of automatically detecting the number of instruments playing in a given audio track/segment. In this task, we will not only consider ensembles of instruments with very distinct characteristics (e.g. voice, guitar, percussion) but also ensembles of instruments with very similar spectral characteristics (e.g. string instruments such as guitar, tiple, bandola[1]). Initial results on this task have been presented in [3].

2. **Meter Extraction**: we aim to develop methods for automatic classification of simple and compound meters. This task is particularly challenging in some music traditions where both duple and triple rhythms are combined. This practice, known as *sesquialtera*, leads to the combination of 3/4 and 6/8 rhythmic patterns. Sesquialteras are common in Colombian *Bambucos*, a music genre from the Andes region in Colombia.

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[1]See a description of the different Colombian string instruments: `https://acmus-mir.github.io/andes-music/`

ISMIR Late-Breaking/Demo [Unrefereed]

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3. **Scale Analysis**: in line with the work conducted in [4], we aim to develop methods for scale and mode identification with special focus on music from the Colombian Andes. As part of this work, we will analyse musical traditions such as the Colombian Caucan flutes, which show tone/semitone distributions that fall outside of equal temperament.

4. **Speech-Music Characterization**: similar to the work presented in [5], we aim to develop methods to distinguish speech data from music data, and further provide fine-grained classification labels such as instrumental music or vocal music. Additionally, we aim to characterize in more detail the melodic and prosodic elements of a number of vocal expressions found in certain regions of Colombia. This analysis might bring light into the functional aspects of these traditions [1].

All the music data used in this research is part of the **Músicas Regionales Archive** hosted by the Universidad the Antioquia in Medellín, Colombia. Músicas Regionales is a music research and documentation center that holds a significant number of collections acquired through various research projects, and through the purchase, donation and exchange of specialized volumes. The music in the archive is representative of the cultural and regional diversity of Colombia. It includes music from different indigenous peoples, from Afro-Colombian groups in the Pacific and the Caribbean, and a very representative collection of rural and urban musical expressions of the Colombian Andes and the Orinoquia. As part of the work conducted within the ACMus project, a selection of annotated data from the Músicas Regionales Archive has been made available to the research community as the **ACMUS-MIR dataset** [6].

All the information, resources and updates from the ACMus project can be found on the project website: `https://acmus-mir.github.io/`.

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