

ChordATune - an Emotion based Melody Harmonizer for Piano Music

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Abstract –Harmonization is a crucial task in piano music creation. However, it is a tedious task for novice piano players. This is because piano players need to keep track of the extensive set of western music rules and concepts, and also need years of training and practice to harmonize a melody accurately. This research addresses the problems of harmonization and proposes an interactive learning tool, ‘ChordATune’ that facilitates piano players, song writers and music students to experiment with harmonization concepts to create harmonies effectively incorporating emotions, genre, beat and tempo.

Keywords – Artificial Intelligence, Automatic Music Composition, Hidden Markov Model, Dynamic Programming

I. INTRODUCTION

Piano music is built upon melody and harmony [1]. Once the basic melody of a song is created, it is essential to accompany that melody with accurate harmony [2]. Therefore, finding the most suitable harmony is a crucial task for students as well as players [2].

This paper focuses on a learning tool that can ease the task of harmonization for novice pianists by introducing a software tool ‘ChordATune’ that harmonizes a given melody according to the emotional factor and the genre of choice. The main goal of this research is to involve the user with the emotional factor when creating harmony, thereby letting the user experiment with different styles and varieties of chord progression when displaying the harmonized melody. This helps novice pianists to develop their creativity in song writing and music creation.

II. RELATED WORK

There are several tools related to automatic accompaniment. MySong, an accompaniment tool that gives accompaniment to a given vocal melody [3] and Tonica, a four part choral harmonizing tool that harmonizes a given melody by generating the other 3 parts of the choral bias to the composer Bach [4]. Arranger tool and Harmony Assistant [5] both provide instrumental harmony to a given melody. However, none of these tools focus on piano music harmonization or creativity. Therefore, ChordATune

focuses on piano music and gives the user an opportunity to experiment with music.

III. CHORDATUNE OVERVIEW

The aim of the ChordATune system is to give a clear understanding of harmonization to novice pianists and to create accompaniments that are musically correct. Since there can be more than one accompaniment for a given melody, ChordATune allows variations of accompaniments according to the emotional factor of the melody and the genre of music along with drum beats and guitar chords.

IV. CHORDATUNE IMPLEMENTATION

In the ChordATune system the relationship of the melody and chord progression is mapped according to Hidden Markov Model concepts. The ChordATune system is designed for 24 different types of chords; 12 Major chords and 12 Minor chords. Based on the emotional factor a percentage of happiness/sadness of the given input melody is calculated. Around 250 lead sheets were used to train the ChordATune system, each of them having monophonic melodies associated with relevant chord progressions. Once the melody is processed and HMM properties are initialized, the chords are generated using the Viterbi algorithm. These generated chords are then arranged according to the genre or in a guitar tabular format.

V. EVALUATION

ChordATune was evaluated using two different aspects; 1) Analysis of ChordATune as a learning tool according to Kolb’s Experiential Learning and 2) Critical analysis from the users perspective.

According to David A Kolb’s learning theory, Experiential Learning can be divided into four different categories as Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE) [6]. Table 1 shows how the above learning theories are applied in ChordATune learning concepts.

ChordATune’s main aim is to assist learners to enhance their learning process. Therefore, it was necessary to find out how effective the tool was for learners.