

Automatic Movie Posters Classification into Genres

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Abstract. A person can quickly grasp the movie genre (drama, comedy, cartoons, etc.) from a poster, regardless of short observation time, clutter and variety of details. Bearing this in mind, it can be assumed that simple properties of a movie poster should play a significant role in automated detection of movie genres. Therefore, visual features based on colors and structural cues are extracted from poster images and used for poster classification into genres.

A single movie may belong to more than one genre (class), so the poster classification is a multi-label classification task. To solve the multi-label problem, three different types of classification methods were applied and described in this paper. These are: ML-kNN, RAKEL and Naïve Bayes. ML-kNN and RAKEL methods are directly used on multi-label data. For the Naïve Bayes the task is transformed into multiple single-label classifications. Obtained results are evaluated and compared on a poster dataset using different feature subsets. The dataset contains 6000 posters advertising films classified into 18 genres.

The paper gives insights into the properties of the discussed multi-label classification methods and their ability to determine movie genres from posters using low-level visual features.

Keywords: multi-label classification, data transformation method, movie poster.

1 Introduction

One of the goals of a poster is to convey information about a movie (genre, etc.) to potential moviegoers without them paying a lot of attention. With just a cursory glance at a poster while driving along or looking shortly while passing by, a person can grasp the movie genre (drama, comedy, cartoons, etc.) from variety of perceptual and semantic information on the poster. Taking this phenomenon [1] into account one can suppose that relevant information for determining the genre could be contained in global low-level features such as dominant color, spatial structure, color histogram, texture, etc.

Keeping this in mind our goal was to develop a method that would automatically determine the movie genres using mostly global low-level features of movie posters.

We used data from the TMDB [2] and realized that the problem we are dealing with is a multi-label problem since most of the movies belong to more than one genre.

For example, “Delivery Man” belongs to Comedy, “The Wolf of Wall Street” belongs to Crime, Drama and Comedy genres and „The LEGO Movie“ belongs to Adventure, Fantasy, Animation, Comedy, Action and Family genres. The problem is even more complex as the number of possible genres is large and there is no limit to the number of genres a film can be classified into.

The issue of classifying a film into genres from their supporting promotional material (trailers) has recently attracted some attention. In the paper [3], low-level features are extracted from movie trailers and used to classify 100 movies into 4 genres (drama, action, comedy, horror). In [4] GIST, CENTRIST and W-CENTRIST scene features are obtained from a collection of temporally-ordered static key frames. These feature representations are used as visual vocabulary for genre classification and their discriminate ability is tested on 1239 movie trailers.

In [5] the same visual features were used as in [3]. Movies were classified into three genres (action, drama, and thriller) which were selected because of their frequency among movies that were played in Taiwan from 2004 to 2006. Some additional genres were grouped together and presented as those three (e.g. drama included comedy and romance while thriller included horror).

All these approaches [3-5] consider only a single genre per movie in order to reduce the problem to the single-label classification case and apply the classic methods for single-label classification.

However, many different approaches have lately been developed to solve multi-label classification problems. These methods were primarily focused on text classification (news, web pages, e-mails etc.), but lately there are more and more domains in which they are applied, such as functional genomics classification (gene and protein function), music and song categorization into moods and genres [6], scene classification [7], video annotations, poster classification [8], etc. Comparison of methods for multi-label learning is given in [9].

In our approach, we treat the poster classification into movie genres as a multi-label classification task.

In Section 2, two methods for multi-label problem adaptation are explained. Both methods were applied to the poster classification problem, in an experiment as detailed in Section 3. The obtained results are compared and presented in Section 4. The paper ends with a conclusion and directions for future work.

2 Adaptation of the Multi-label Problem

The aim of our work is to develop a method that will automatically provide a list of relevant labels (movie genres) for a given, previously unseen poster, based on extracted low-level features. A movie can belong to more than one genre; therefore the task of poster classification into movie genres is a multi-label classification problem.

Multi-label classification of an example e_j can be formally expressed as:

$$\exists e_j \in E : \varphi(e_j) = \{C_l, C_m\} \cup Z, Z \subseteq \bigcup_{i=1}^k C_i, l, m \in 1..k, l \neq m, \varphi: E \rightarrow C, \quad (1)$$