Differential Diagnostic Characterization of Radiology Teaching Files using Measures of Term Coverage and Content Similarity

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Abstract

Abstract text goes here, justified and in italics. The abstract would normally be one paragraph long. See Table 1. for appropriate abstract length by submission type.

Introduction

A radiology teaching file (TF) is a system containing a collection of cases with teaching values that can serve multiple functions, including refresher of important cases to not be missed, repository of cases for teaching and clinical follow-up, and reference in understanding the spectrum of a disease1. TFs can be categorized in three types: (1) personal TFs that are meant for the general use of the TF owner, (2) shared in-house TFs where the owner makes the TF content available for viewing with their colleagues, institution, or beyond, and (3) public TFs build on the shared model, but with more comprehensive content that may undergo a formal review before “publication” 2.

A recent national survey assessing the role and desired features of radiology teaching files found that, among the 396 respondents from 115 institutions, 89% use some form of TF from which 76% keep a personal TF using a variety of media and 67% use a shared in-house TF, while 83 institutions had paid subscription to a public TF repository1. Public TF solutions have become increasingly popular, providing users with instant access to thousands of cases of varying quality 3, sometimes for a fee. These solutions include StatDx, RadPrimer, and ACR Learning Files (the most popular among survey respondents) as well as Radiolopolis, BrighamRad, EuroRad, MedPix, Aunt Minie, ACR Learning files, MyPACS.Net, and RSNA Medical Image Repository Consortium (MIRC). While all of these public and commercial solutions are available, most do not permit a user to (1) easily submit personal cases to their libraries, (2) perform efficient querying, categorization and searching for cases, (3) simulate basic PACS functionality, and (4) enable self-directed and assessed learning – all very important TF features as identified by at least 50% respondents of the survey 1.

Therefore, as the first step to organize and extract the text information content in a large TF repository, we have designed and developed an unsupervised machine learning approach to capture the main differential diagnosis concepts in the repository and partition the TFs based on their main content. In the proposed approach, teaching files are modeled in a vector space of RadLex terms 4 and compared to each other through a similarity measure. This similarity is used to cluster teaching files and identify the repository’s underlying topics. We applied our approach on the RSNA MIRC dataset with 2,000 free publically available teaching files. Our method identified 5 major topics and 50 subtopics in the repository using the differential diagnosis information and clustered the teaching files accordingly to these topics. Our results are verified by a domain expert radiologist and successfully explain the repository’s primary topics and extract the corresponding teaching files.

In addition to the hierarchical organization of the teaching files repository based on their RadLex content, we also propose to visualize and analyze the coverage of the RadLex terms by the teaching file repository. This will help in quantifying the completeness of the TF repository which, in conjunction with information on the representation of each cluster topic (given by the number of teaching files for each cluster), can provide valuable insights into the information richness of current TF repositories as well as ideas for expanding and diversifying them.

Materials and Methods

MIRC Data Set

MIRC Data Representation

MIRC Categorization

* Clustering
* Clustering Evaluation

Results

Discussion

Another Major Heading and References

This sentence has two reference citations1, 2.

More text of an additional paragraph, with a figure reference (Figure 1) and a figure inside a Word text box below. Figures need to be placed as close to the corresponding text as possible and not extend beyond one page.



**Figure 1.** Total allergy alerts, overridden alerts, or drug order cancelled.

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**Table 1.** Submission type, abstract length, and page length maximum for AMIA submissions.

|  |  |  |
| --- | --- | --- |
| **Submission Type** | **Abstract Length** | **Page Length Maximum – *If your submission is longer than what is specified below, it will be rejected without review*** |
| Paper  Stu | 125-150 words | Ten  TenTen tenTen ttem  Ten |
| Student Paper | 125-150 words | Ten  tem |
| Poster | 50-75 words\* | One |
| Podium Abstract | 50-75 words\* | Two |
| Panel | 150-200 words | Three |
| System Demonstrations | 150-200 words | One |

**\*** All podium abstract and poster submissions must have a brief (50-75 words) abstract. The abstract does NOT have to be part of the document, but must be entered on the submission website in the Abstract box in Step 2.

This is another paragraph.

Conclusion

Your conclusion goes at the end, followed by References, which must follow the Vancouver Style (see: www.icmje.org/index.html). References begin below with a header that is centered. Only the first word of an article title is capitalized in the References.

References

1. Dashevsky B, Gorovoy M, Weadock WJ, Juluru K. Radiology Teaching Files: An Assessment of Their Role and Desired Features Based on a National Survey. J Digit Imaging 2015; 28: 389.
2. Bhargava P, Dhand S, Lackey AE, Pandey T, Moshiri M, Jambhekar K: Radiology education 2.0—on the cusp of change: part 2. eBooks; file sharing and synchronization tools; websites/teaching files; reference management tools and note taking applications. Acad Radiol 2013; 20:373–381.
3. Seitz J, Schubert S, Völk M, Scheibl K, Paetzel C, et al. Evaluation of radiological teaching programs in the internet. Radiologe 2003; 43:66–76.