Analysis of Topic Trends in Biomaterial Research

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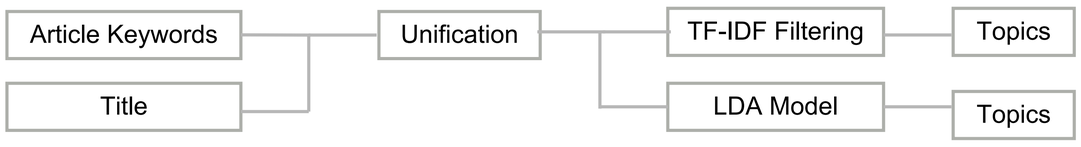
Background

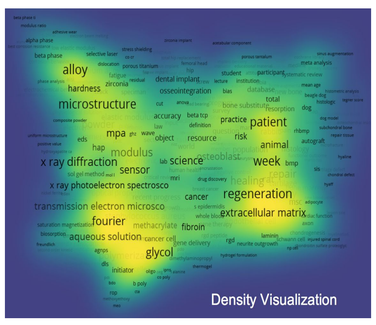
A great number of biomaterials have been strongly developed in many fields of academic research. For academic publishing companies like Weily, the prediction of topics trends can make contribution to the marketing strategy. Our objective is to study the topic trends in biomaterial research and investigate effective features which possibly indicate the emerging and shrinking of topics. Especially, the influence of social medias is discovered.

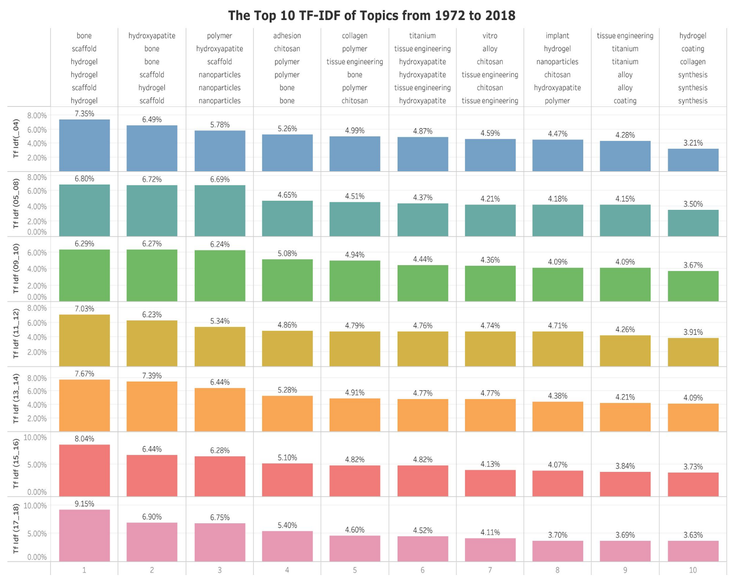
Topics Extraction Process

Data Source: Web of Science Database
Search Terms: “Biomaterials” or “Biomedical Materials”
Record Count: 43480
Timeline: 1972-2018



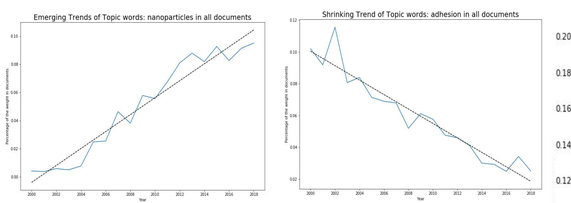
General Overview

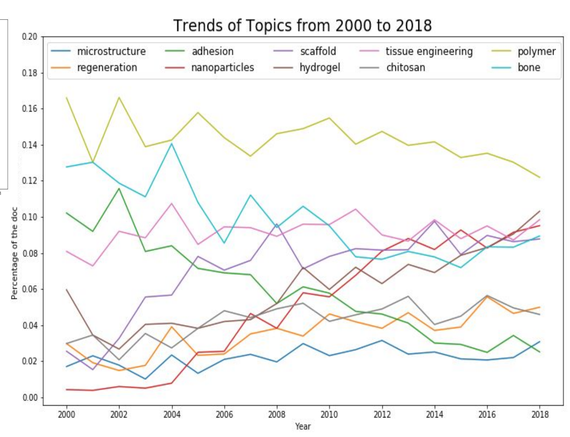




- Density visualization reveals the hottest topics are regeneration, microstructure, alloy and glycol.
- Topics like **bone, hydroxyapatite, polymer** dominated the field before 2010
- **Bone, hydrogel, polymer, chitosan** and **tissue engineering** have stayed on the top 10 topics list for more than 10 years
- **Hydrogel, scaffold** and **nanoparticles** have emerged as rising hot topics since around 2009

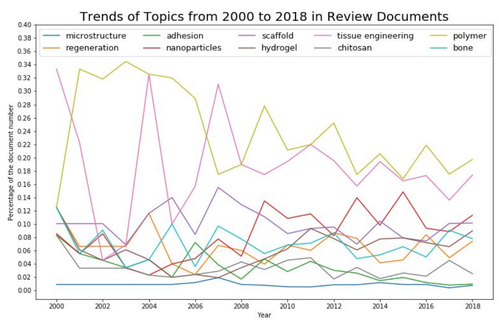
Emerging and Shrinking Analysis





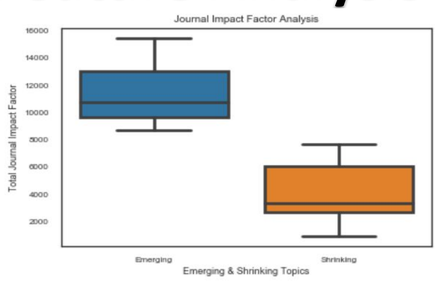
- The emerging trend is discerned with the positive coefficient of the linear fit, while the shrinking trend is correlated with the negative one.
- The emerging topics includes tissue engineering, scaffold, hydrogel, chitosan, regeneration, microstructure, nanoparticles, while the topics of polymer, bone and adhesion are shrinking.

Feature Analysis - Review Types

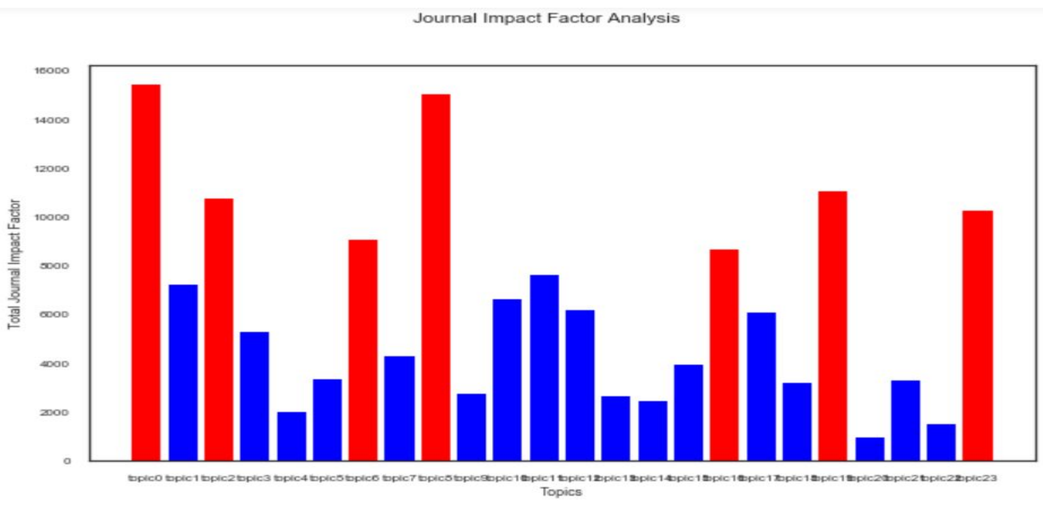


- The fluctuation of topics in review document is relatively stable along with a horizontal line.
- The higher the level of all review proportion, the greater the topic trend that correlates with the linear coefficient.

Feature Analysis - Journal Impact



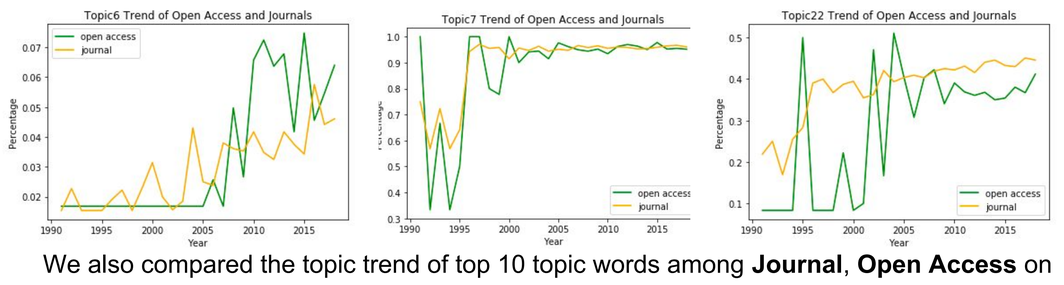
- Topics like **Regeneration, Tissue, Biomaterials and Scaffolds, Tissue, Bone** etc have high Journal impact factor, which are also emerging topics as analysed before.
- Topics like **Microscopy, Laser, dna, beta** and strength etc have very low Journal impact factor which are also shrinking topics.



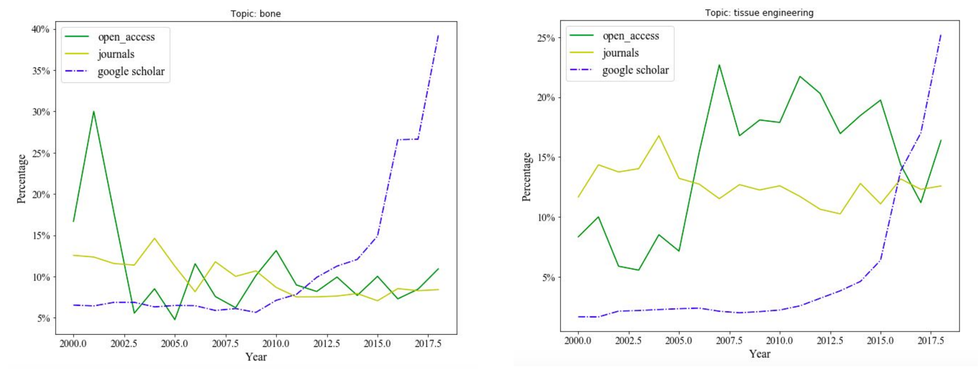
On those journals with very high impact factors, the emerging group has 17 documents published while the shrinking group has only 7 during the early years.

Feature Analysis-Platform

Firstly, we focus on articles that published on **Journal** and **Open Access**. Using LDA model, the 24 topics were generated. Most trends of topics are consistent with each other. However, there are some exceptions differ at certain periods.



We also compared the topic trend of top 10 topic words among **Journal**, **Open Access** on Web of Science and articles on **Google Scholar**. For all top 10 topic words, the topic trend extremely differs between journals and open access, and the topic trend of Google Scholar stays flat before 2015, and then increases abruptly after 2015 for all 10 topics. Thus the social media like Google Scholar may not be a good indicator to discern the topic trends.



Conclusion and Future Work

- We successively verified the previous teams’ work on topic trend analysis in terms of two different method on generating topics.
- Both TF-IDF and LDA models affect the topic classification. Also the update of database have a great influence on topic determination.
- The weight of topics in review portions has a positive correlation with the emerging trend of topics.
- The journal Impact factor is a strong indicator of emerging & shrinking trend.
- Type of platforms for which articles were published also plays an important role in topic trends.
- In future we will ascertain whether the social media like blogs impact the topic trends and structured a predictive model based on all effective features.