



Analysis of Topic Trends In Biomaterial Research

Bibliometric Data Analysis of Topics

Wiley Field Consulting Project Review

Team Members Introduction



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Motivation

Topic
Analysis

Social
Media

Prediction
Model

The background image shows a wide-angle aerial view of the New York City skyline during sunset. The sky is a warm orange and yellow, reflecting off the water of the Hudson River and East River. The city's dense grid of buildings is visible, with numerous skyscrapers, including One World Trade Center, standing tall against the horizon. In the foreground, the ornate spire of the Woolworth Building is prominent. The overall atmosphere is one of urban density and architectural grandeur.

Motivation



Motivation

To investigate:

How
Social Media
might be used as a
Leading indicator
of future topic

The background of the slide is a photograph of a city skyline at dusk or night. The Empire State Building is prominent in the center-left. To its right are several modern skyscrapers, including one with a distinctive curved facade. The sky is filled with dramatic, dark clouds, and the city lights are reflected in the windows of the buildings.

Topic Analysis



Topic Analysis

Topic Extraction Process

TF-IDF

LDA

Define emerging and shrinking Topics

Features analysis

Journal Impact Factor

Funding agencies

Citation

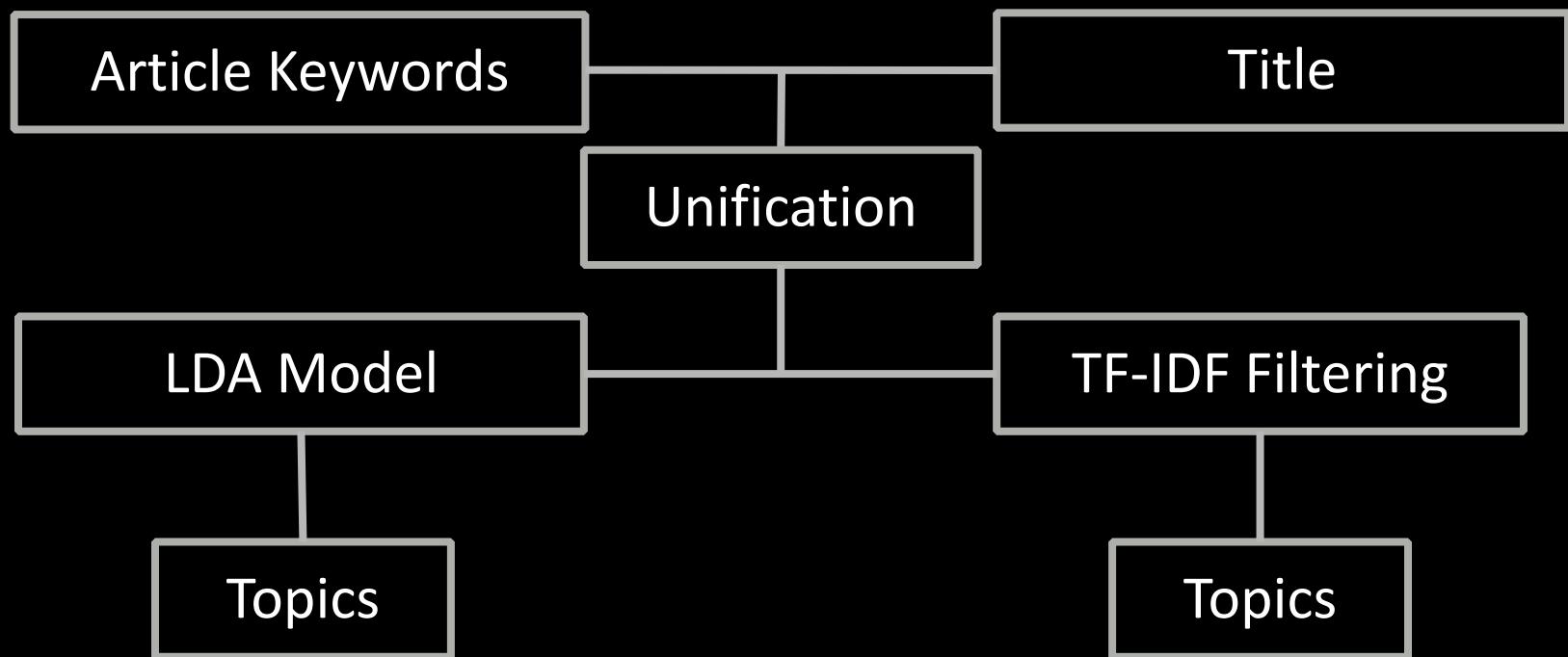
Topic Analysis | Topics Extraction Process

Data Source: Web of Science Database

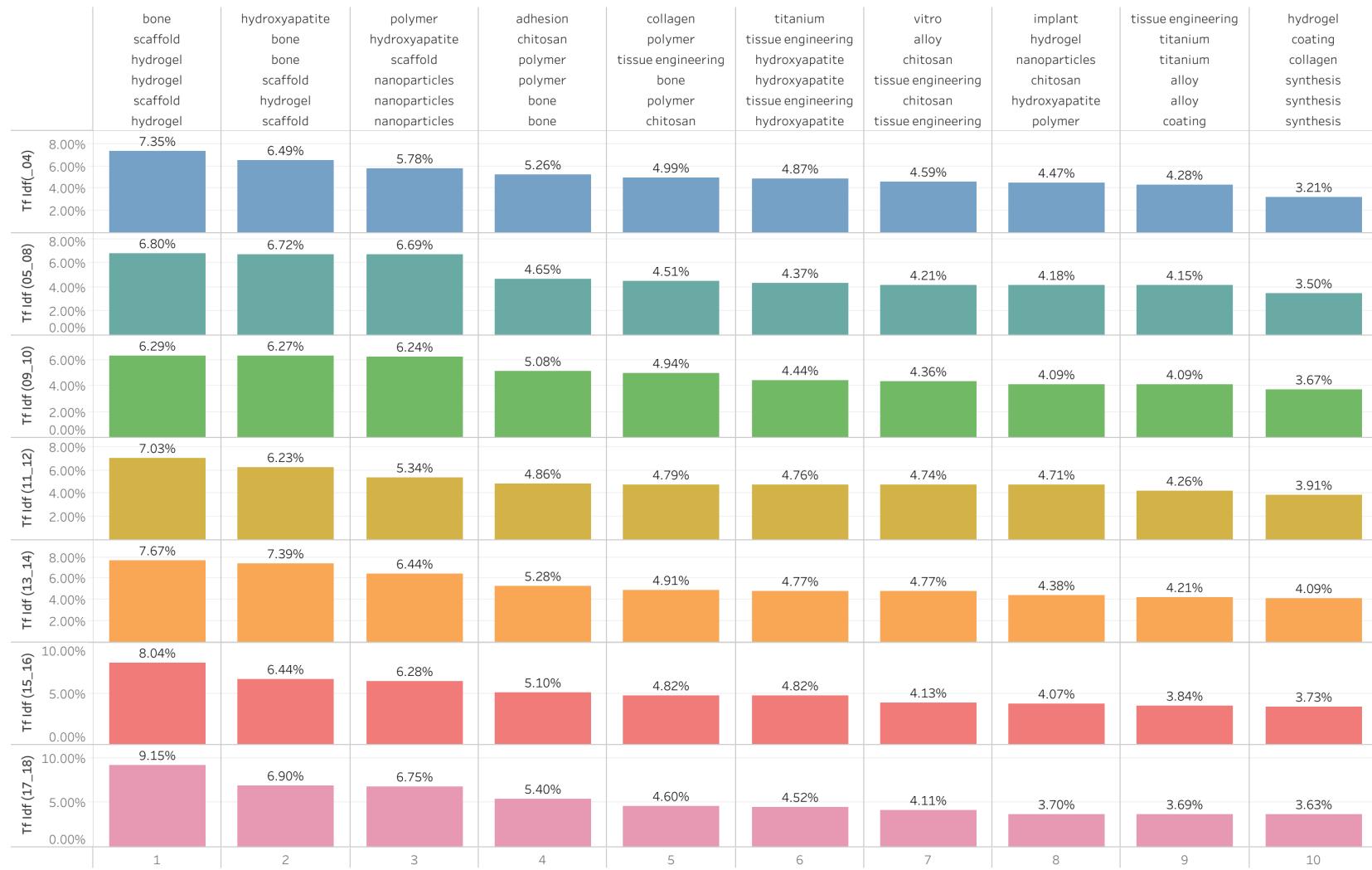
Search Terms: “Biomaterials” or “Biomedical Materials”

Record Count: 43480

Timeline: 1972-2018



The Top 10 TF-IDF of Topics from 1972 to 2018



Bone

Polymer

Chitosan

Tissue Engineering

Hydrogel

Scaffold

Nanoparticles

Regeneration

Adhesion

Microstructure

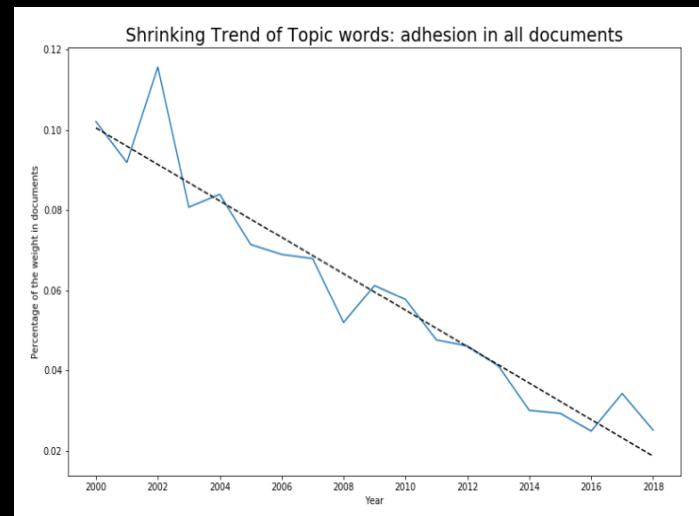
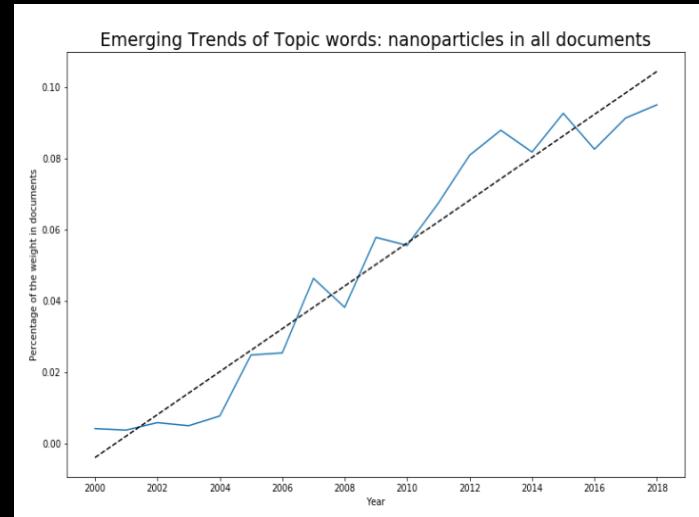
Interested 10

Topics

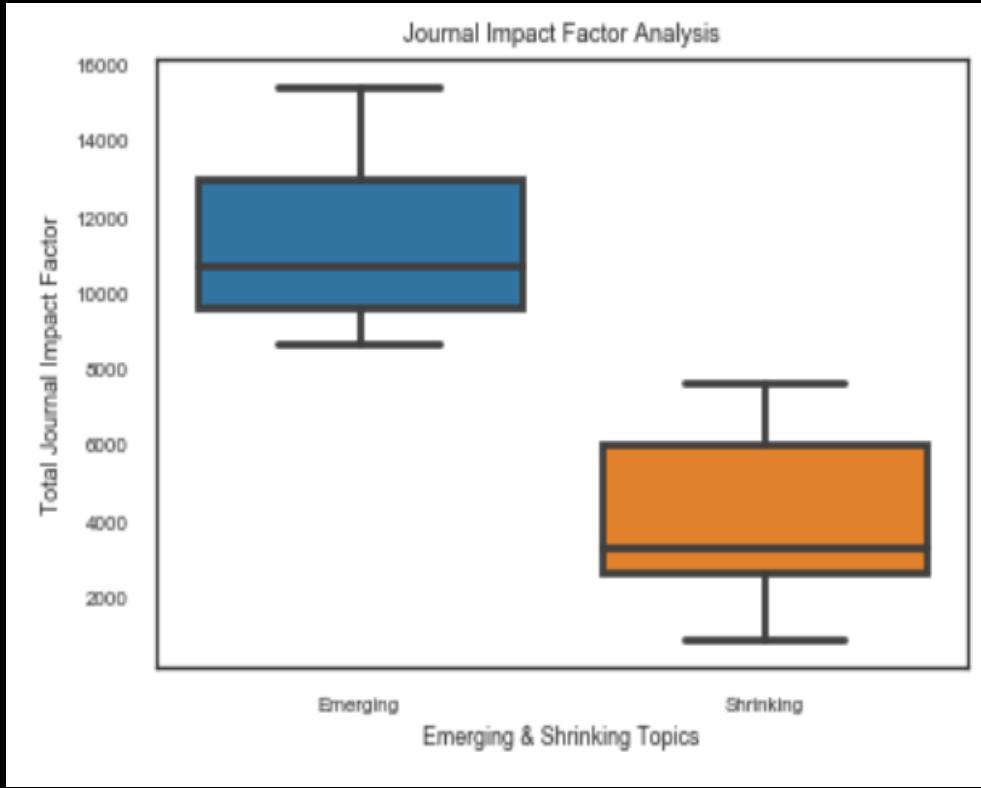
Topic Analysis | Emerging and Shrinking Topics

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.



Topic Analysis | Features analysis



Topics like **Regeneration, Tissue, Biomaterials and Scaffolds, Tissue, Bone** etc have high Journal impact factor, which are also emerging topics as analyzed before.

Topics like **Microscopy, Laser, dna, beta** and strength etc have very low Journal impact factor which are also shrinking topics.



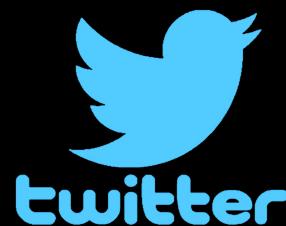
Social Medial analysis



Social Media analysis

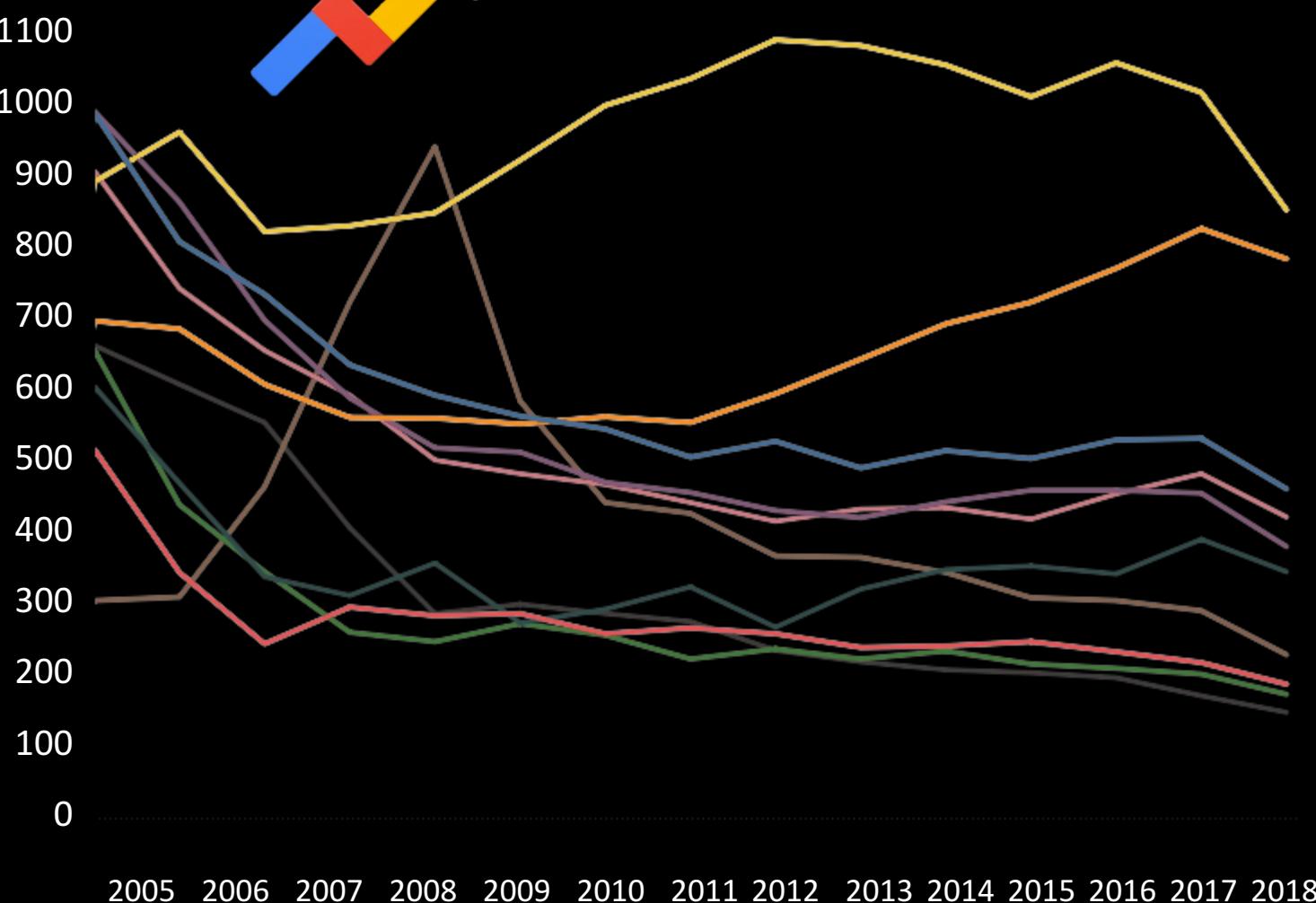


Google Trends



Data description

Google Trends



Measure Names

Adhesion

Bone

Chitosan ■

Hydrogel ■

Microstructure

Nanoparticles

Polymer

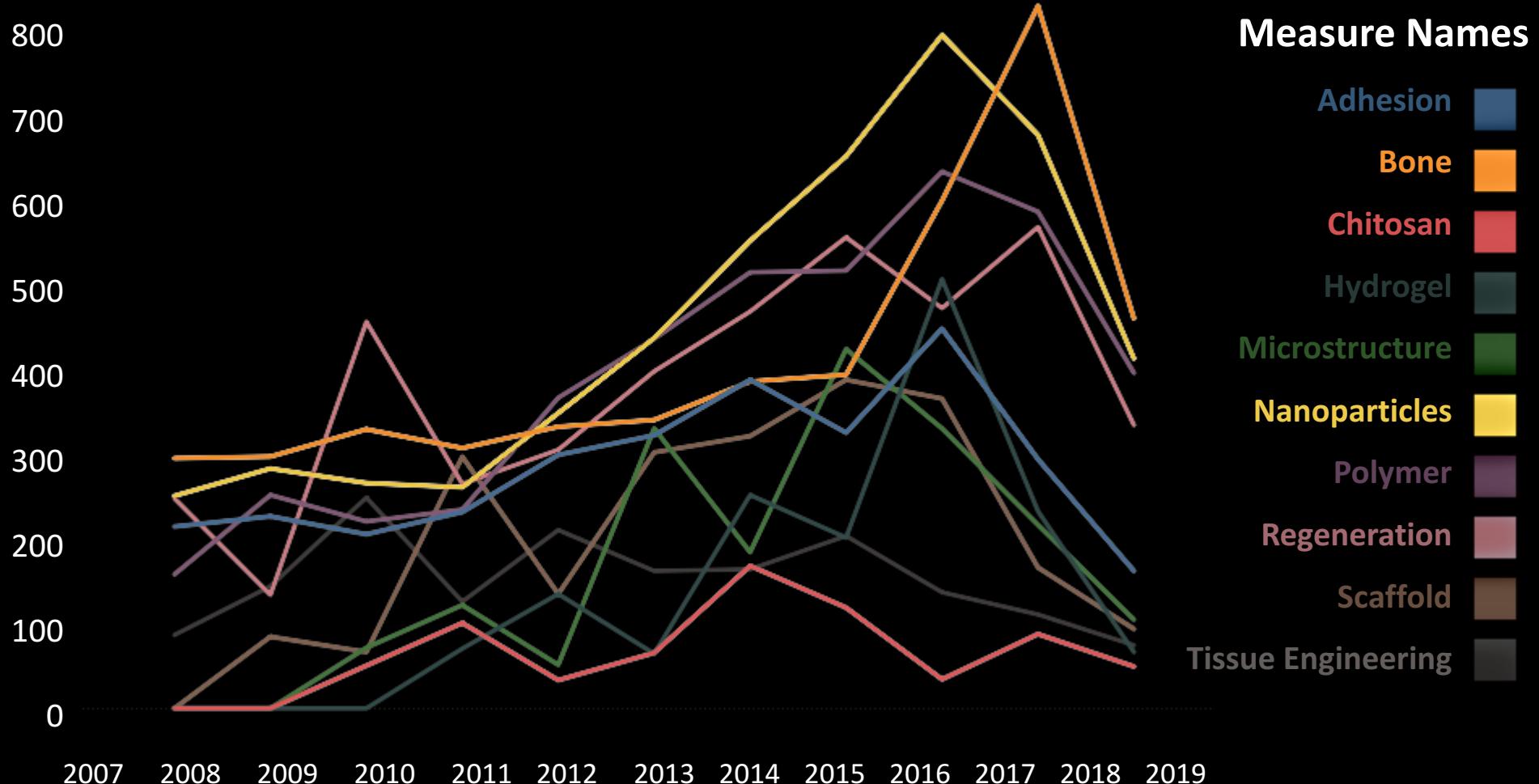
Regeneration ■

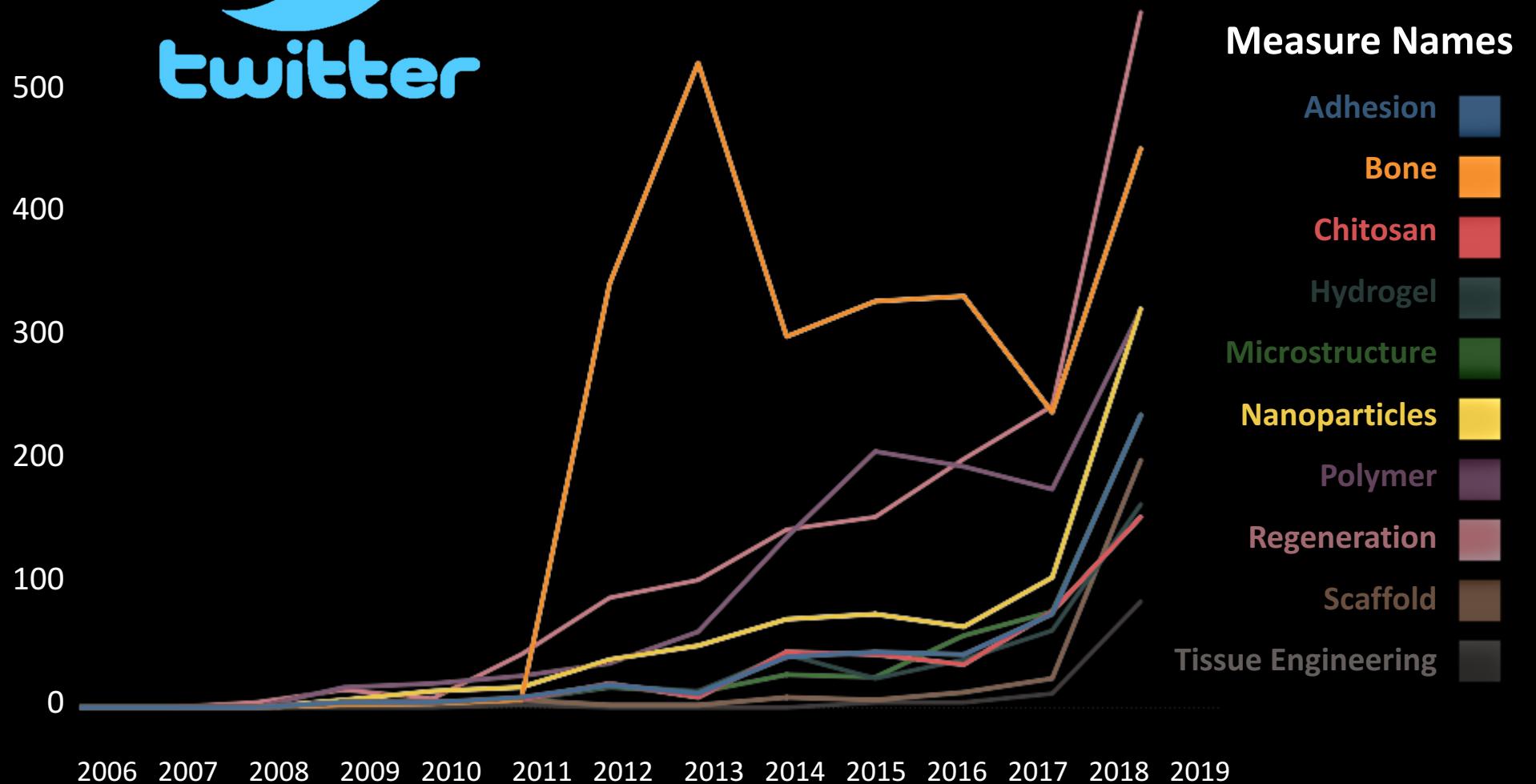
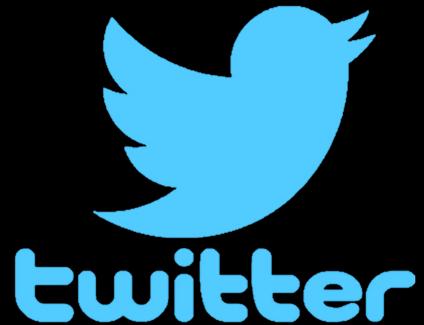
Scaffold

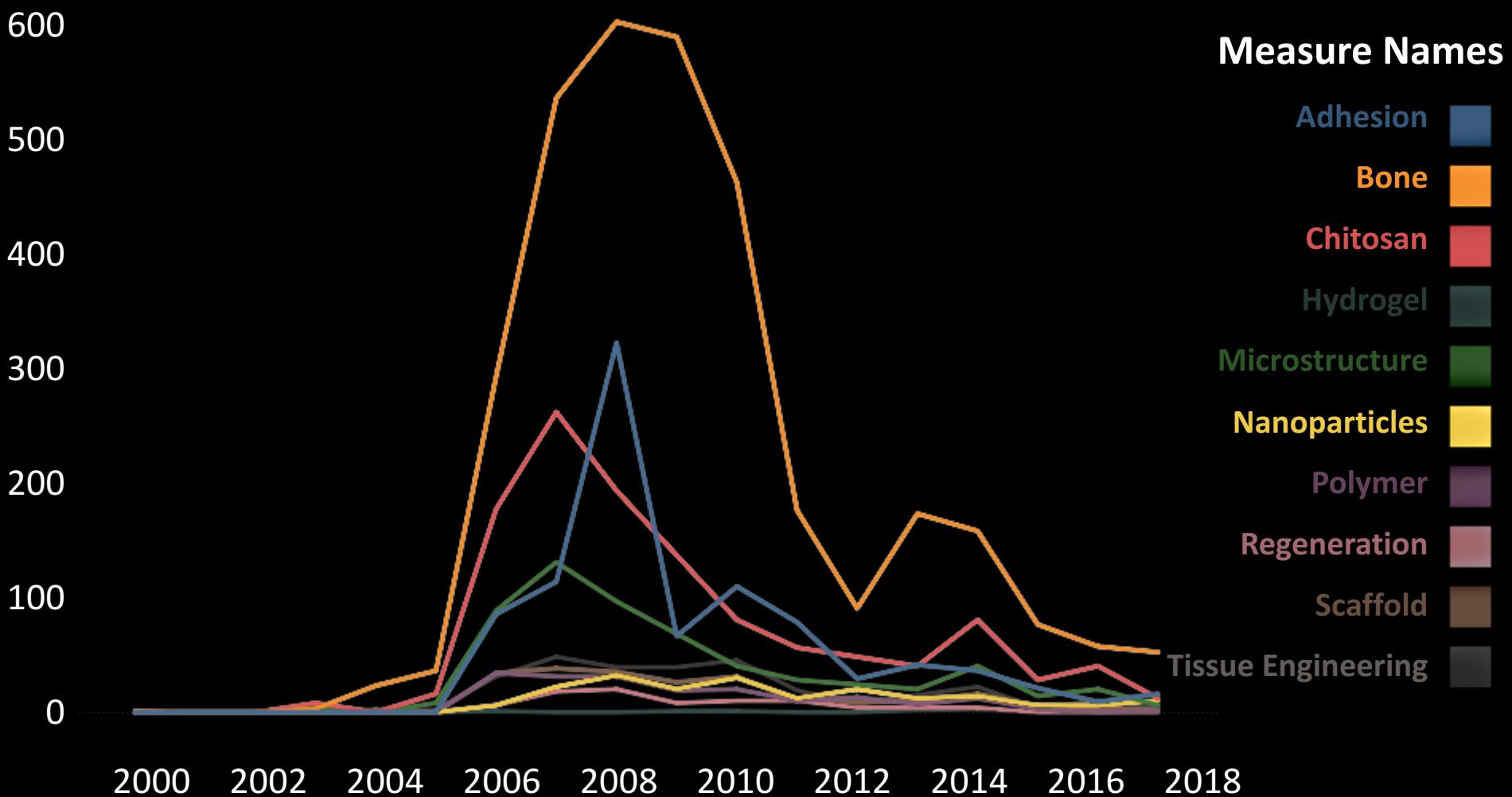
Tissue Engineering



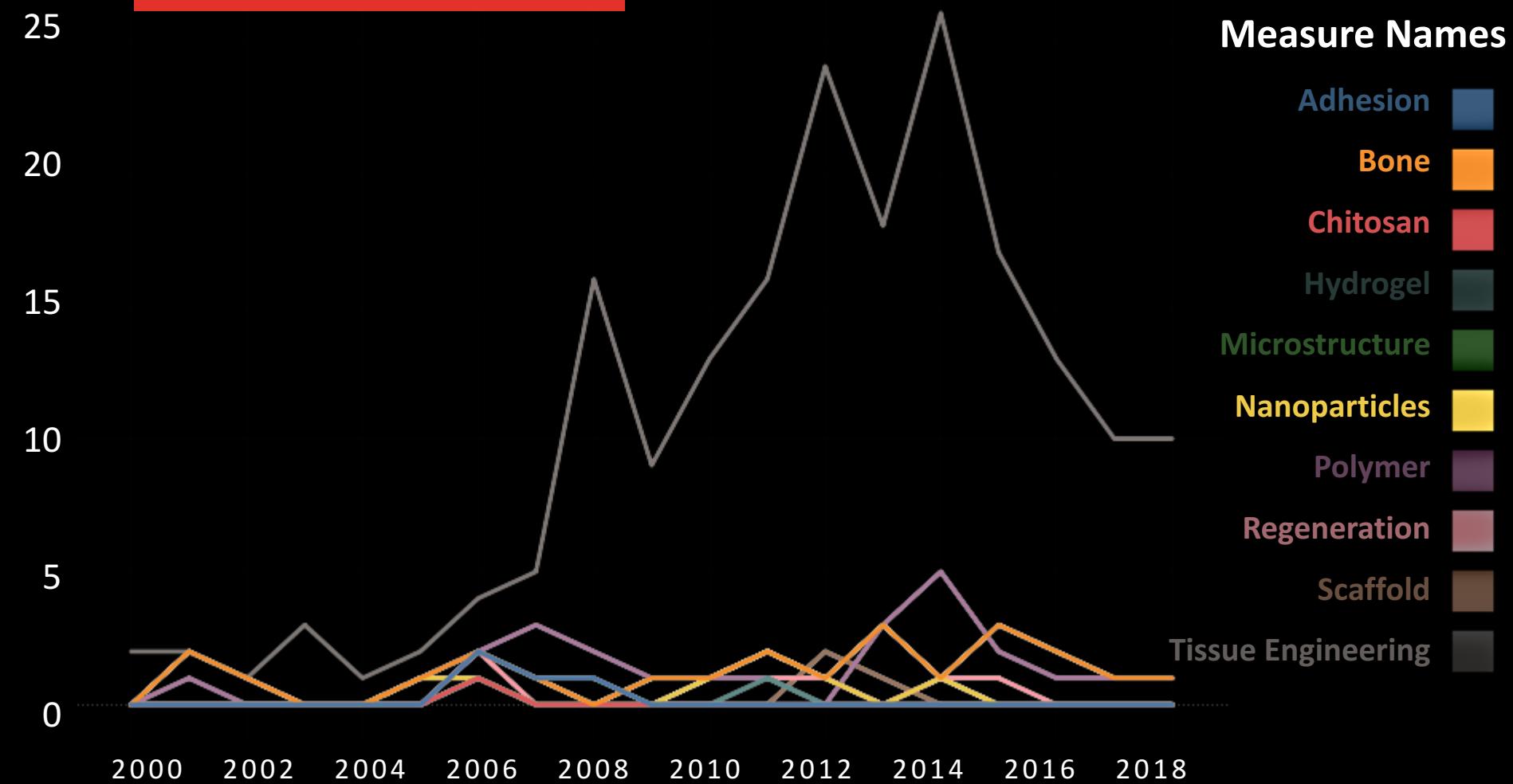
YouTube







SCIENTIFIC AMERICAN



Validation Model

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Modeling

Multi Linear Regression

Validate whether Social Media is significant in determining shrinking/
emerging topics

Time Series

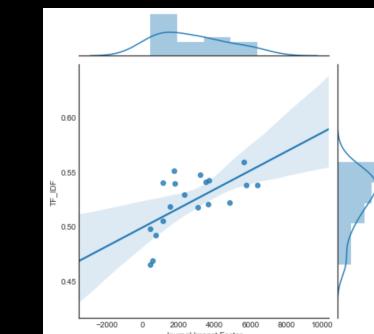
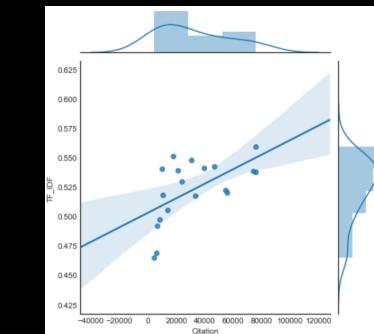
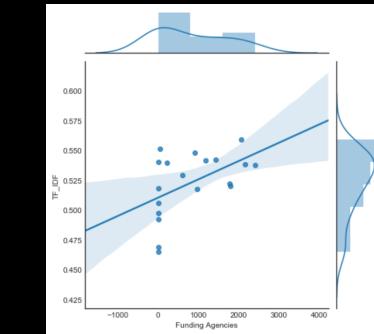
Predict the future topic trend by analyzing time-series of Social
Media past trends

Multi Linear Regression

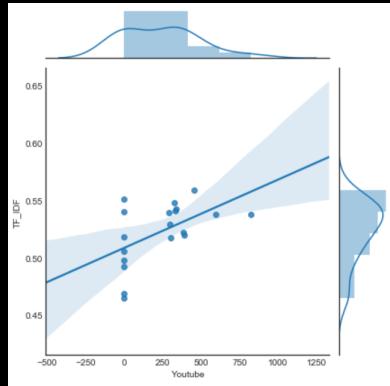
Multiple linear regression is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of multiple linear regression (MLR) is to model the relationship between the explanatory and response variables.

Web of Science Dataset

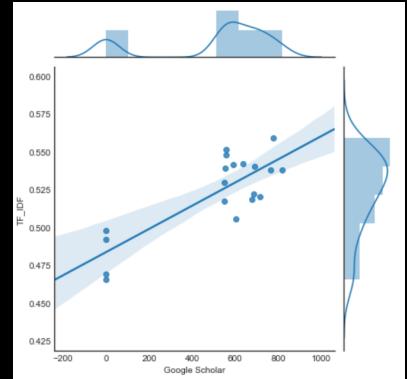
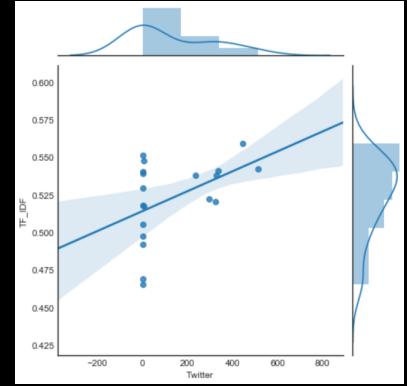
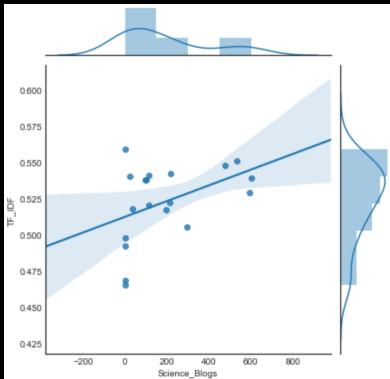
	year	td_idf	citation	fundation	JSR
0	2000	0.465143	4251	0	436.544
1	2001	0.497588	8055	8	400.323
2	2002	0.468688	6111	1	554.236
3	2003	0.492196	6519	0	732.509
4	2004	0.540388	10007	0	1123.900
5	2005	0.518122	10524	0	1541.631
6	2006	0.505447	13806	7	1121.288
7	2007	0.551110	17815	41	1739.140
8	2008	0.539287	21274	223	1807.134
9	2009	0.529353	23556	599	2329.849
10	2010	0.547696	30273	918	3223.065



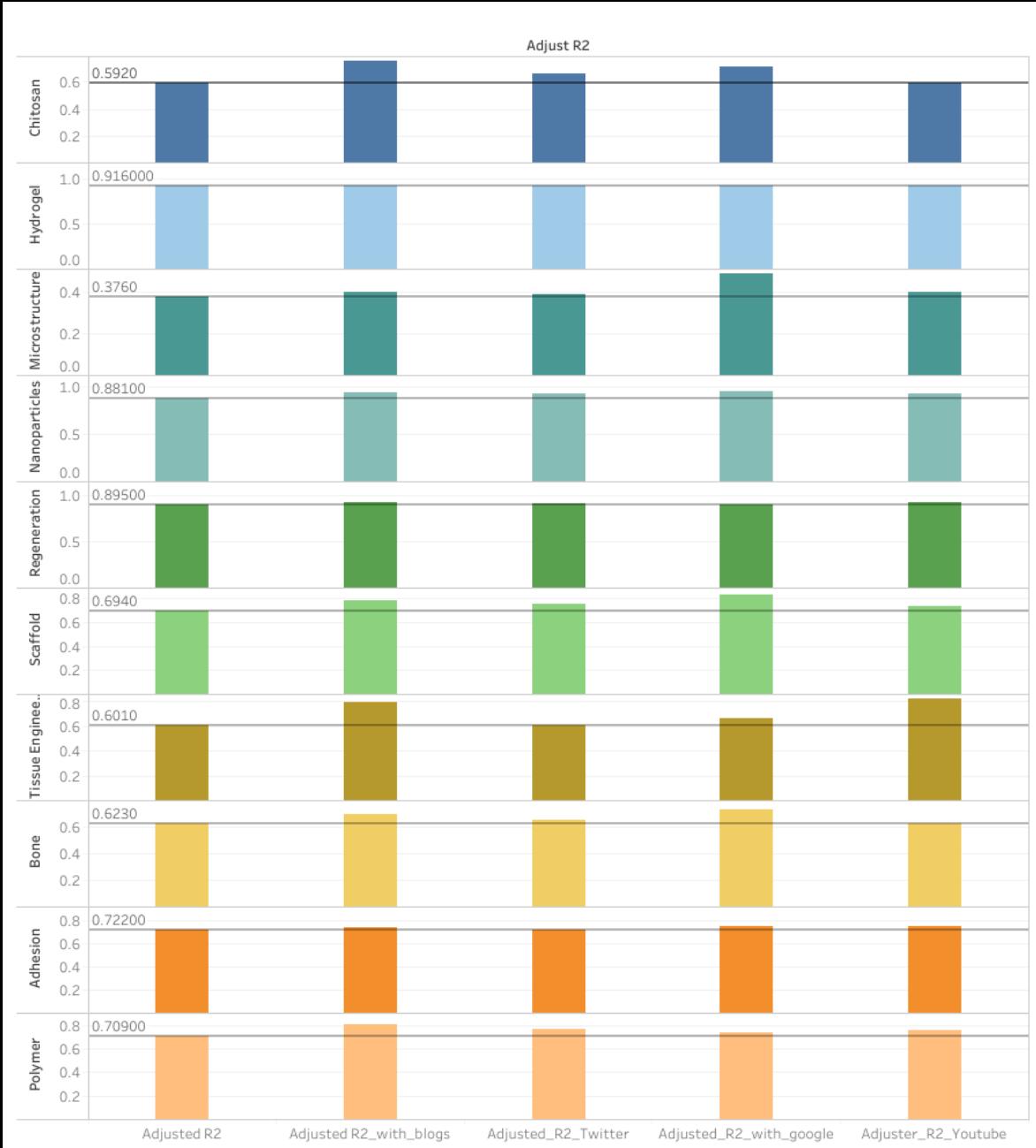
Social Media Dataset



	year	td_idf	citation	fundation	JSR	Social_media
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1	2001	0.497588	8055	8	400.323	2
2	2002	0.468688	6111	1	554.236	1
3	2003	0.492196	6519	0	732.509	3
4	2004	0.540388	10007	0	1123.900	23
5	2005	0.518122	10524	0	1541.631	37
6	2006	0.505447	13806	7	1121.288	294
7	2007	0.551110	17815	41	1739.140	535
8	2008	0.539287	21274	223	1807.134	601
9	2009	0.529353	23556	599	2329.849	594
10	2010	0.547696	30273	918	3223.065	477



Adjusted R2 calculation



Conclusion



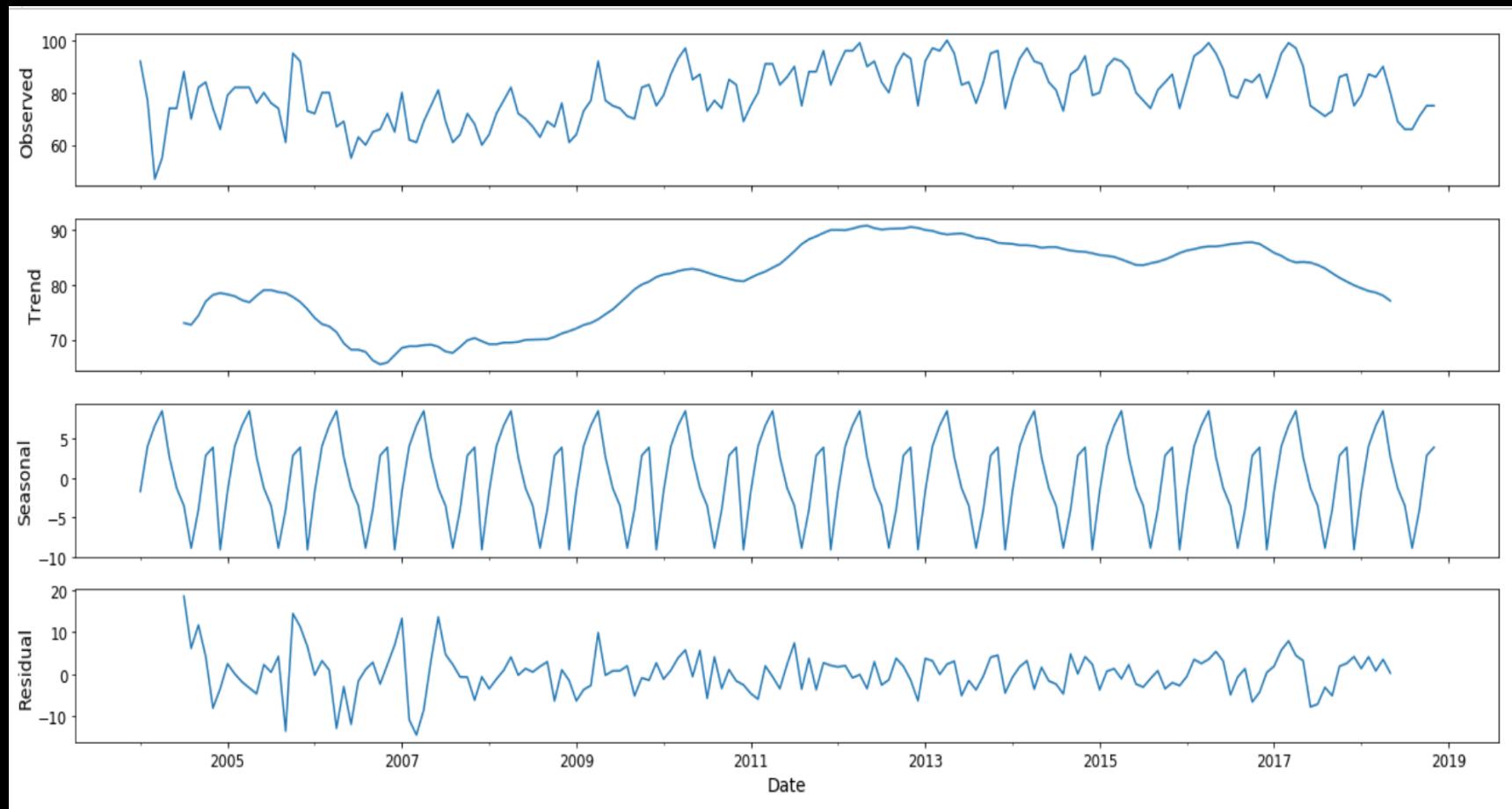
Time Series

Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values.

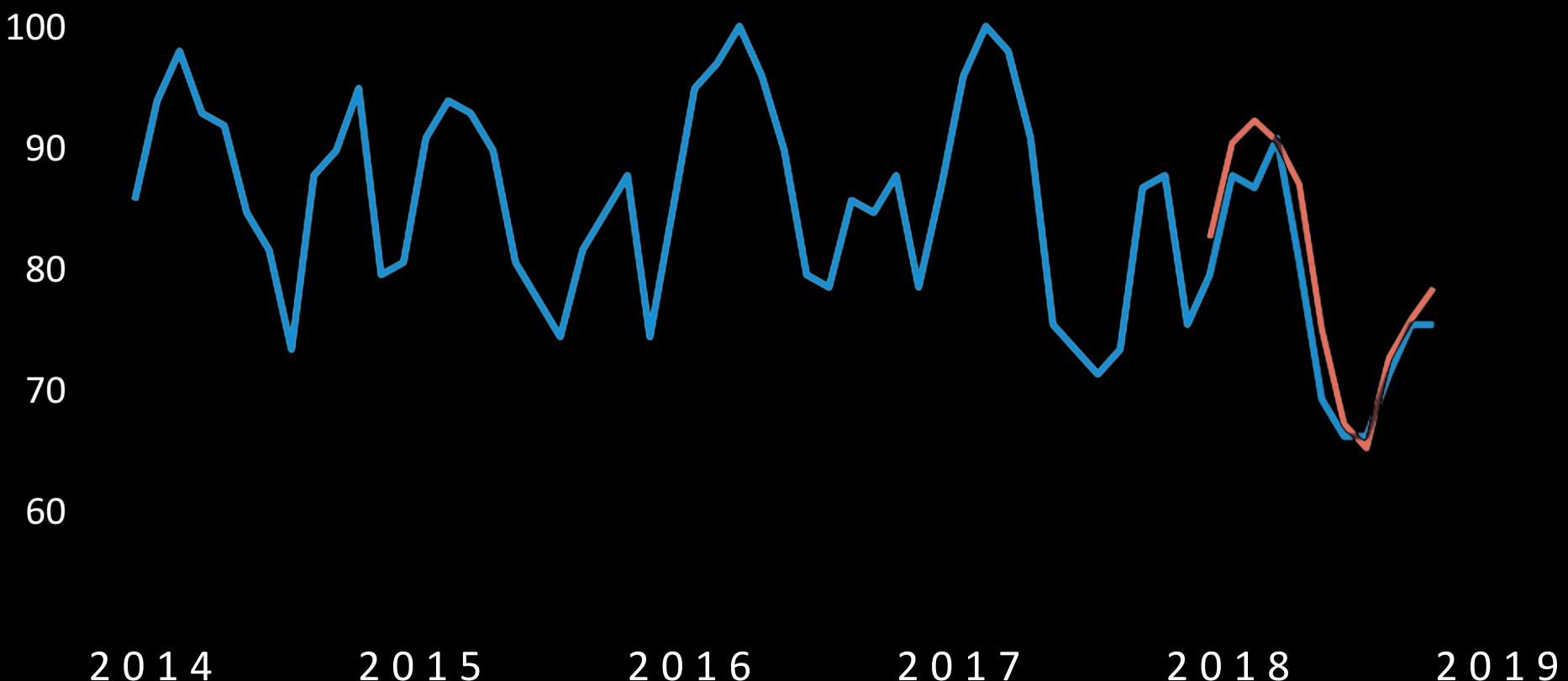
Process of Model

1. Check the Stationarity of a time series
2. Eliminate the trend and seasonality
3. Apply ARIMA model on stationary time series
4. Validate the model
5. Prediction by model

Example | Nanoparticle in Google Search



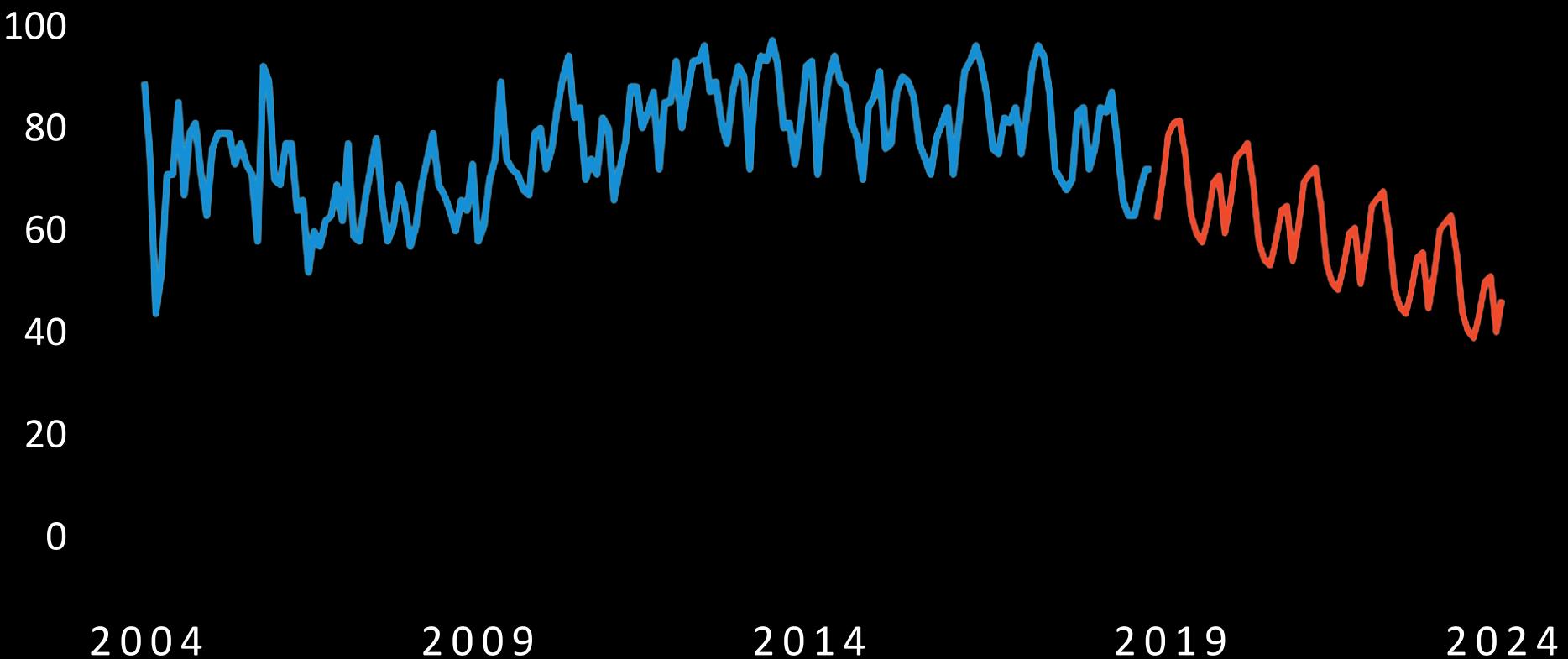
Trends of Nanoparticles from 2004 to 2018 in Google Search



Forecasting

of

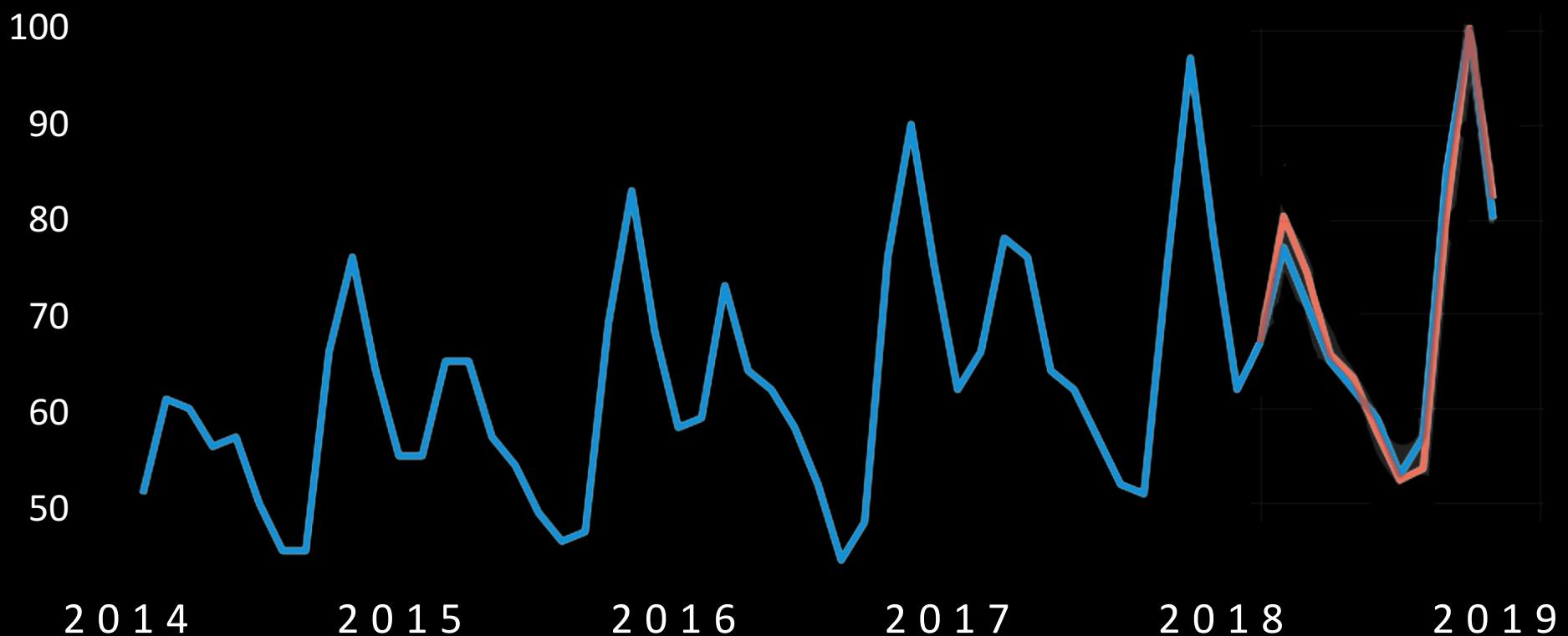
Nanoparticles from 2004 to 2018 in Google Search



Trends

of

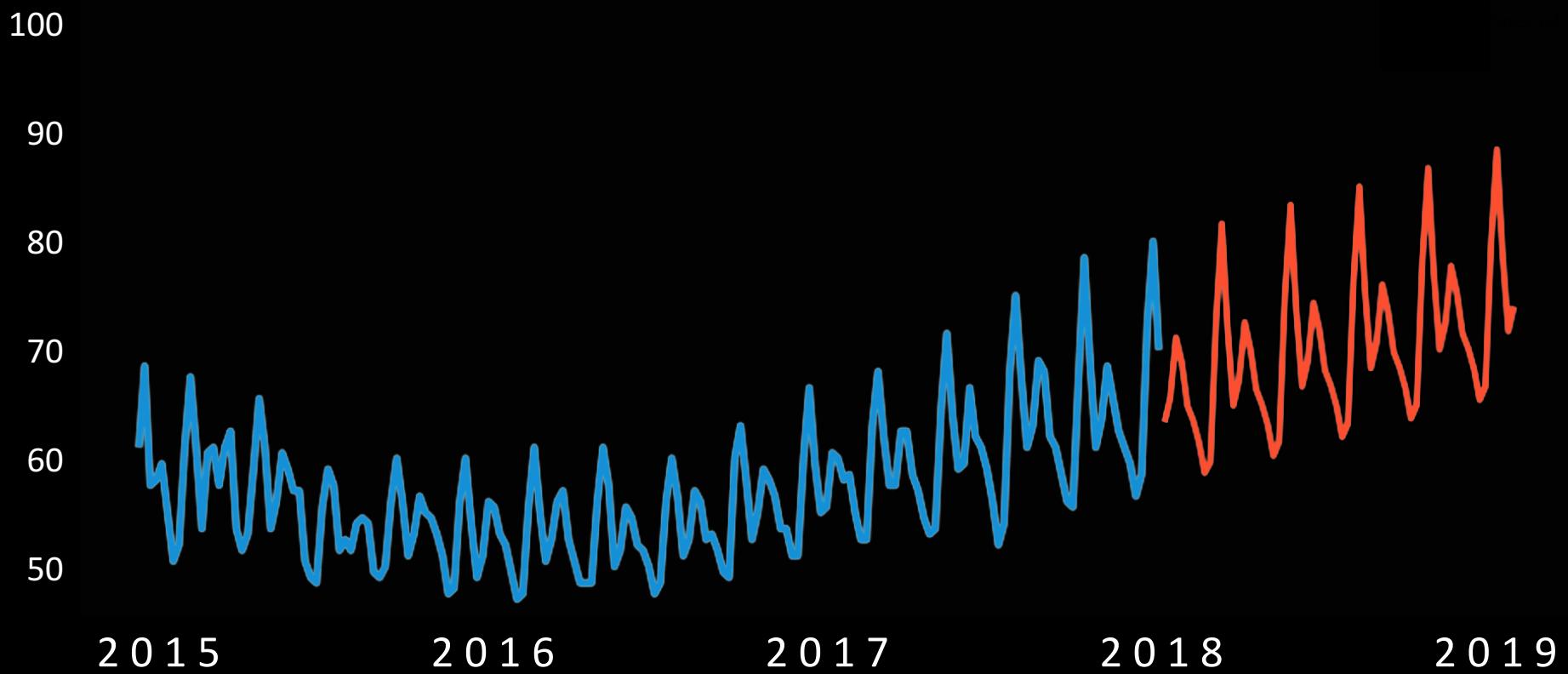
Bone from 2004 to 2018 in Google Search



Forecasting

of

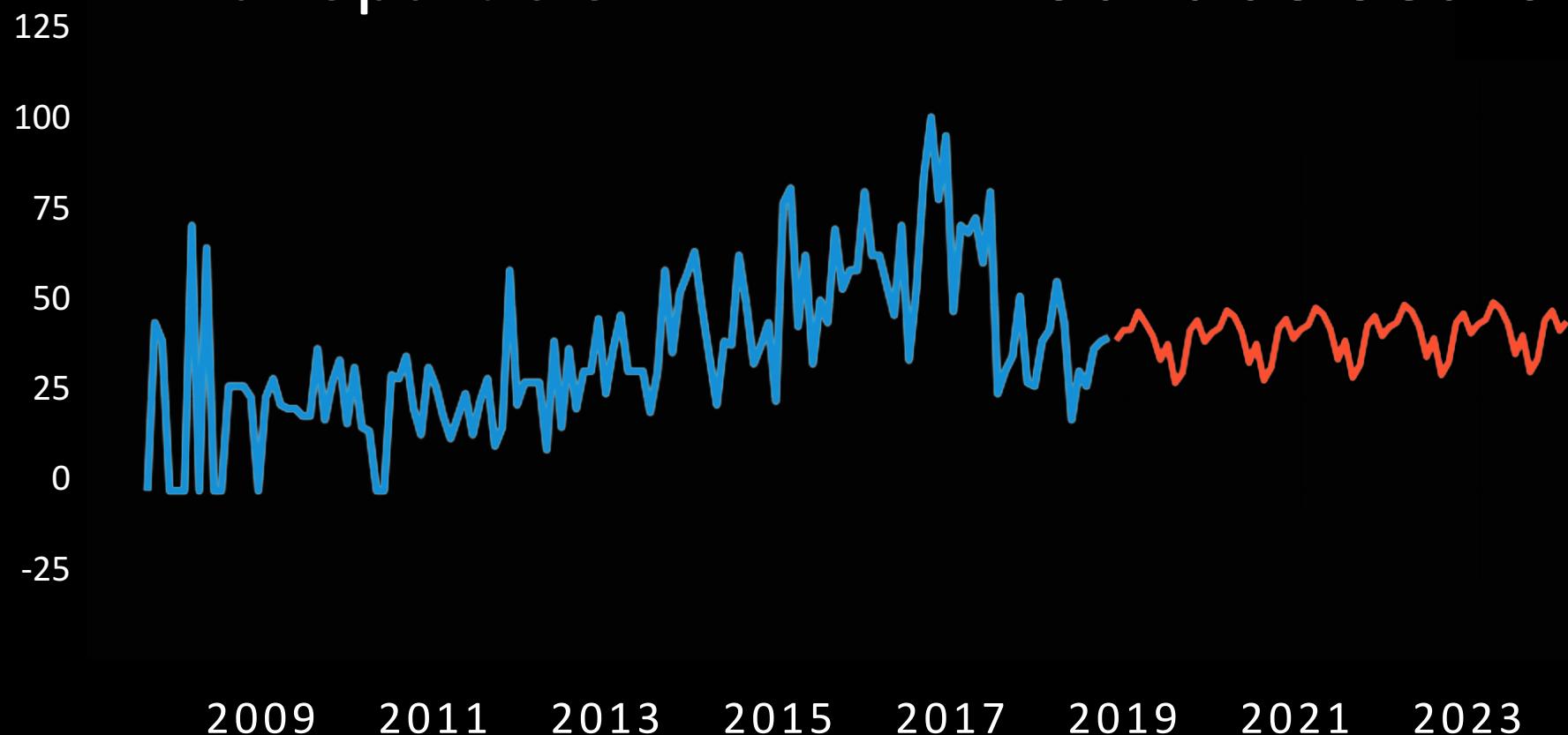
Bone from 2004 to 2018 in Google Search



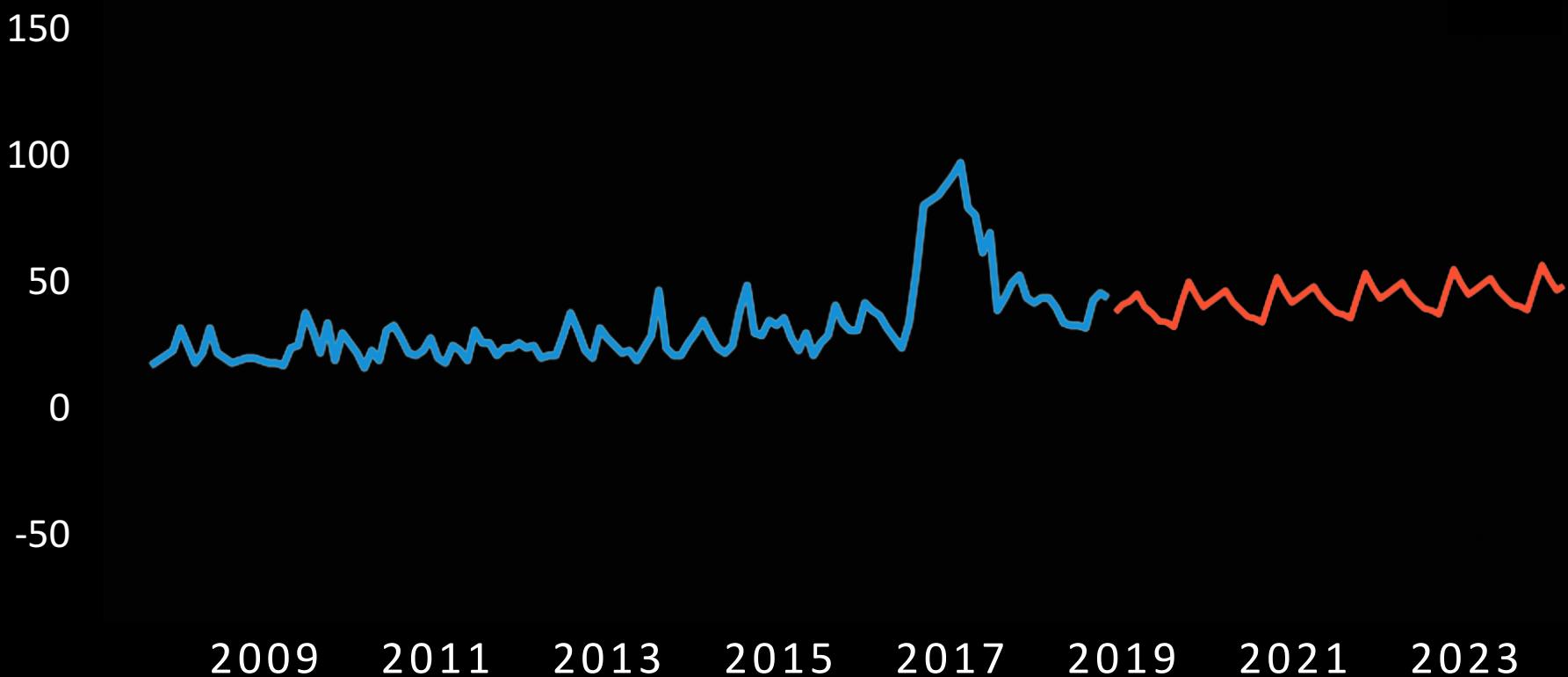
Forecasting

of

Nanoparticle from 2004 to 2018 in YouTube Search



Forecasting of Bone from 2004 to 2018 in YouTube Search



Conclusion of Time Series Model | Google

1 Years Forecasting

5 Years Forecasting

Stable	Emerging	Shrinking
Scaffold Tissue Engineering	Adhesion Polymer Bone	Microstructure Regeneration Nanoparticles Hydrogel Chitosan

Stable	Emerging	Shrinking
Polymer Regeneration Hydrogel Chitosan Adhesion	Bone	Microstructure Nanoparticles Tissue engineering Scaffold

Conclusion of Time Series Model | YouTube

1 Years Forecasting

5 Years Forecasting

Stable

Emerging

Shrinking

Scaffold
Chitosan

Bone

Microstructure
Adhesion
Polymer
Tissue
Engineering
Regeneration
Nanoparticles
Hydrogel

Stable

Emerging

Shrinking

Microstructure
Scaffold
Polymer
Tissue
engineering
Nanoparticles
Hydrogel
Chitosan
Bone

Conclusion

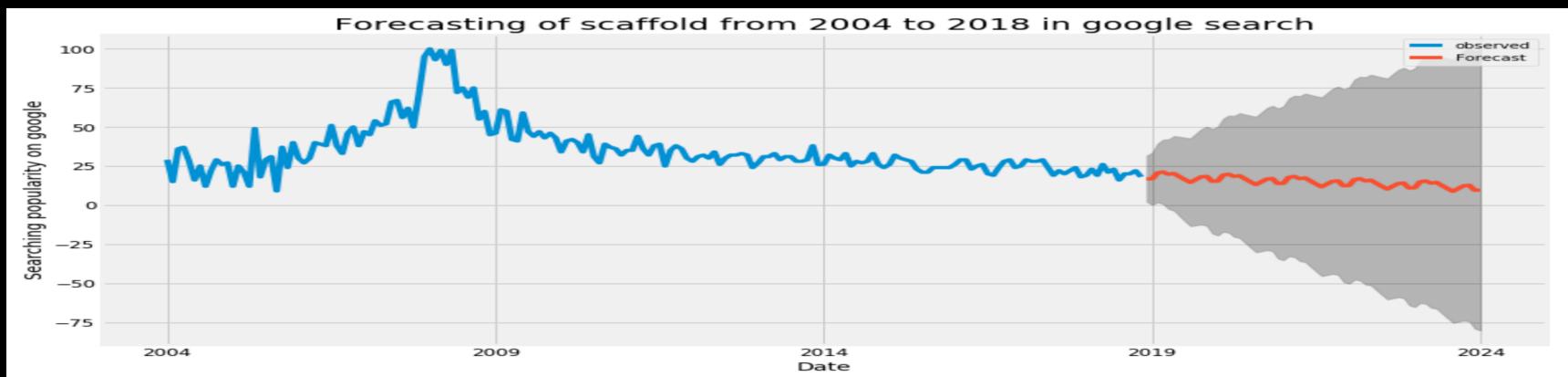
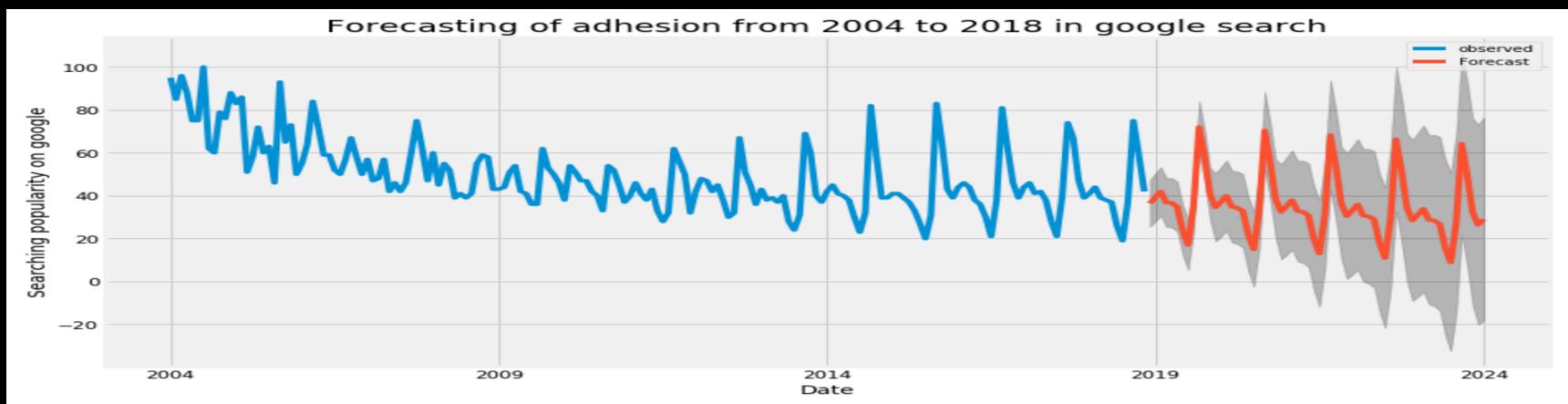
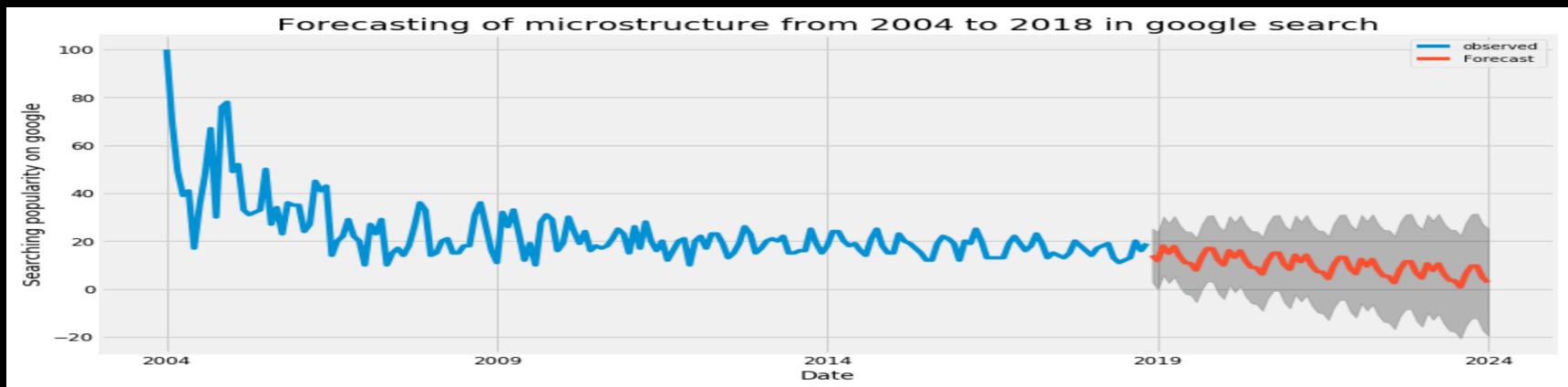
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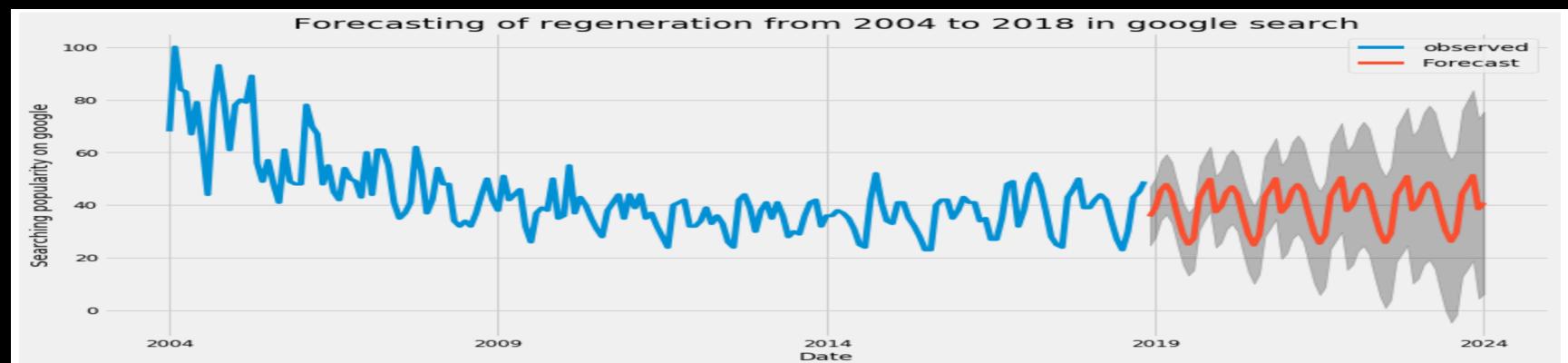
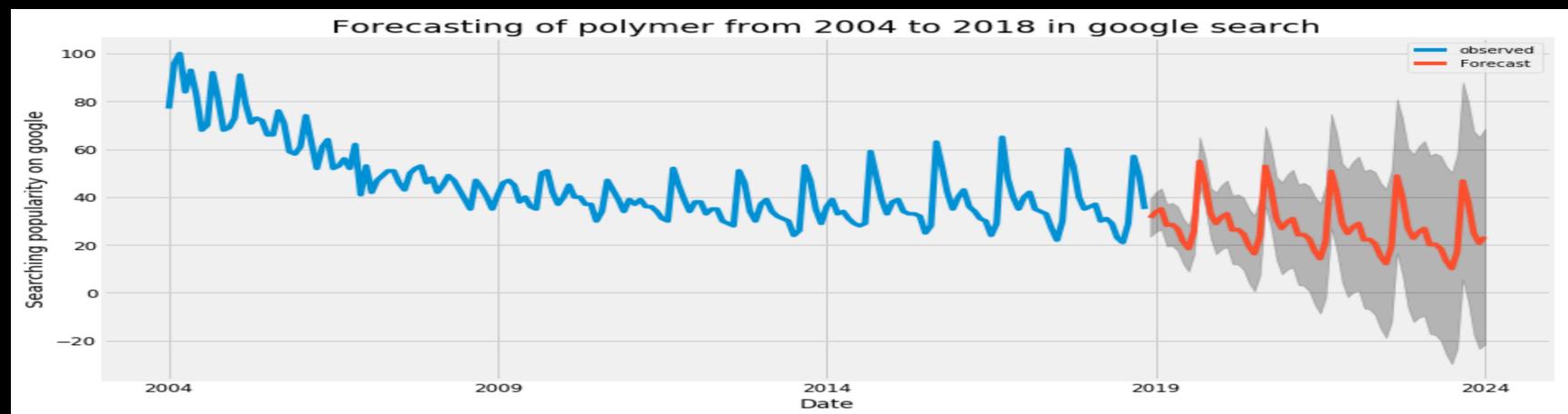
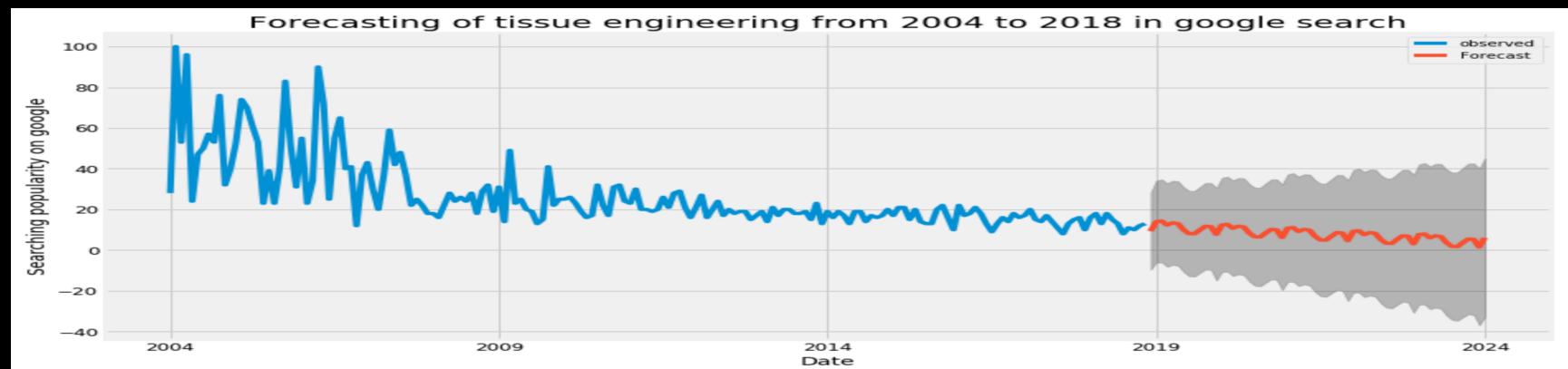


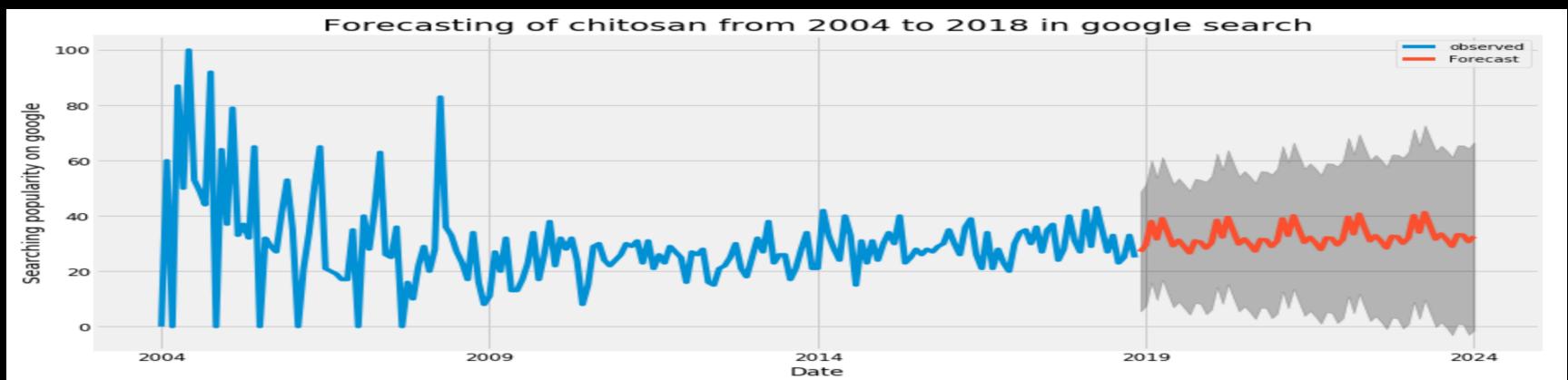
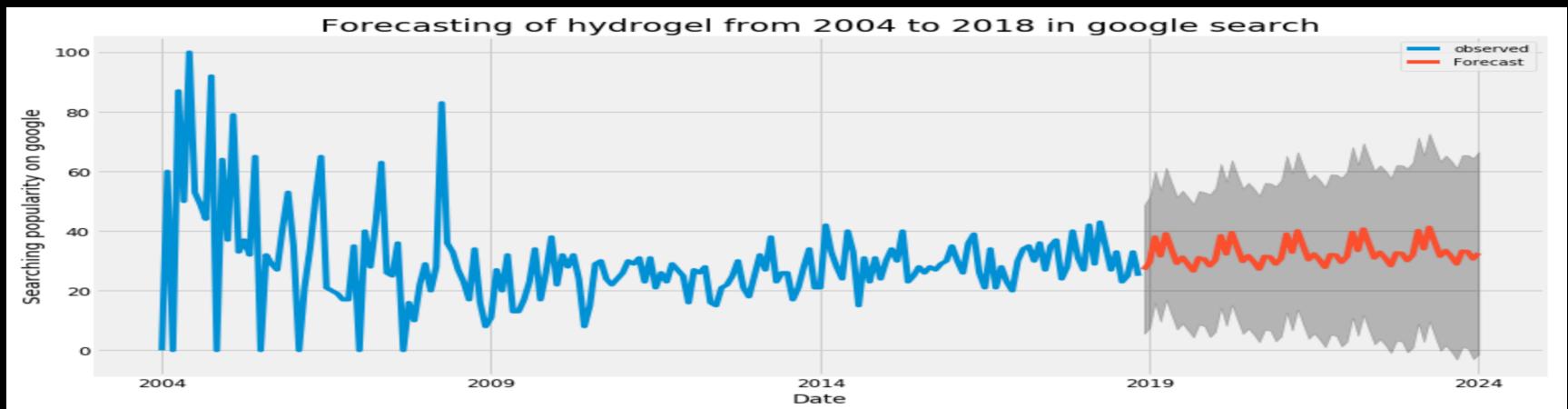
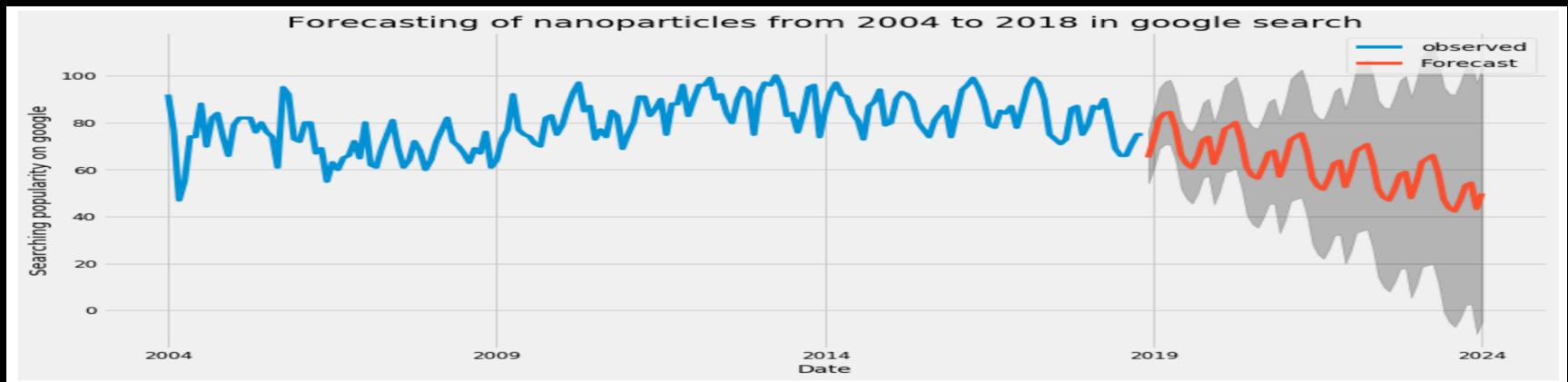
Conclusion

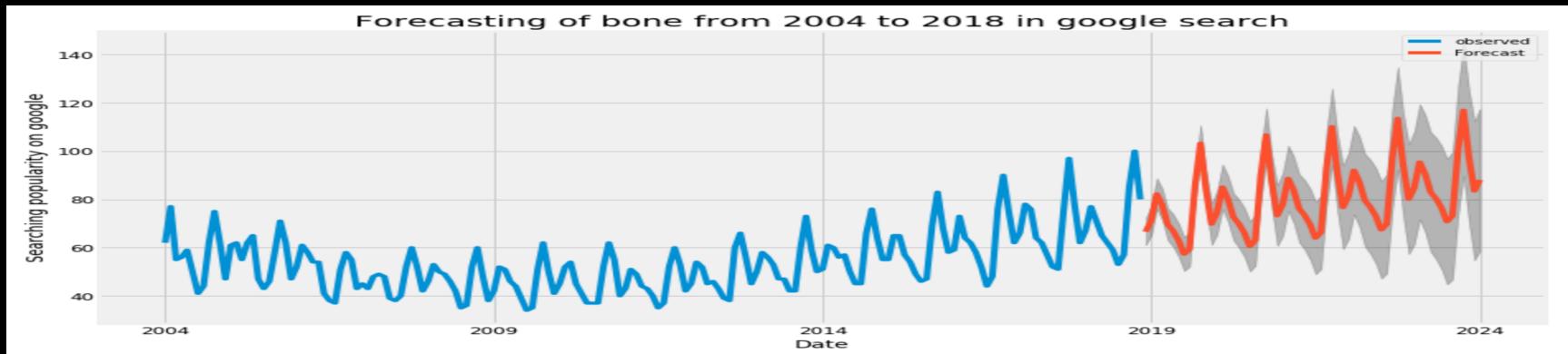
- Successfully validated the previous team's Research
- Proved the effective impact of social media in topic trends
- Predicted the future topic trend based on social media

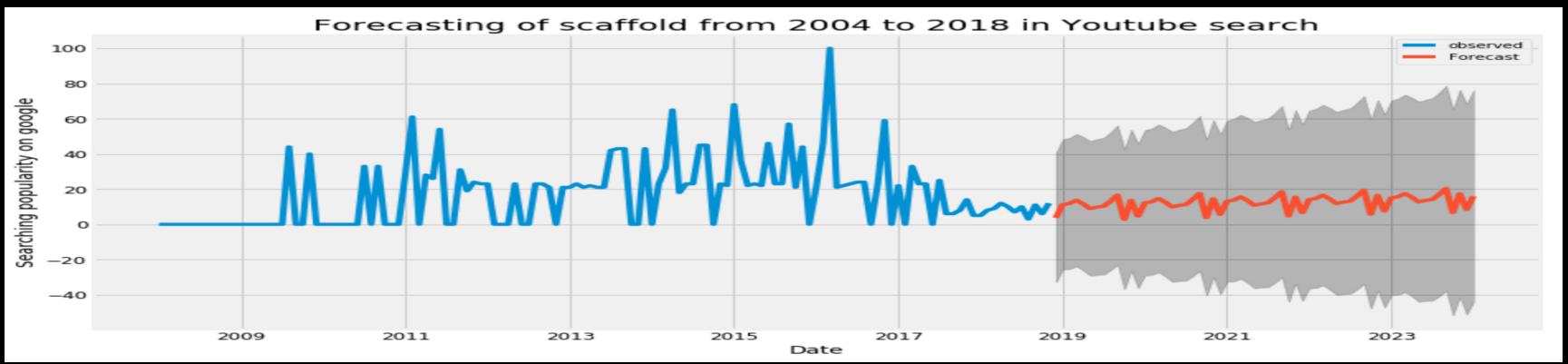
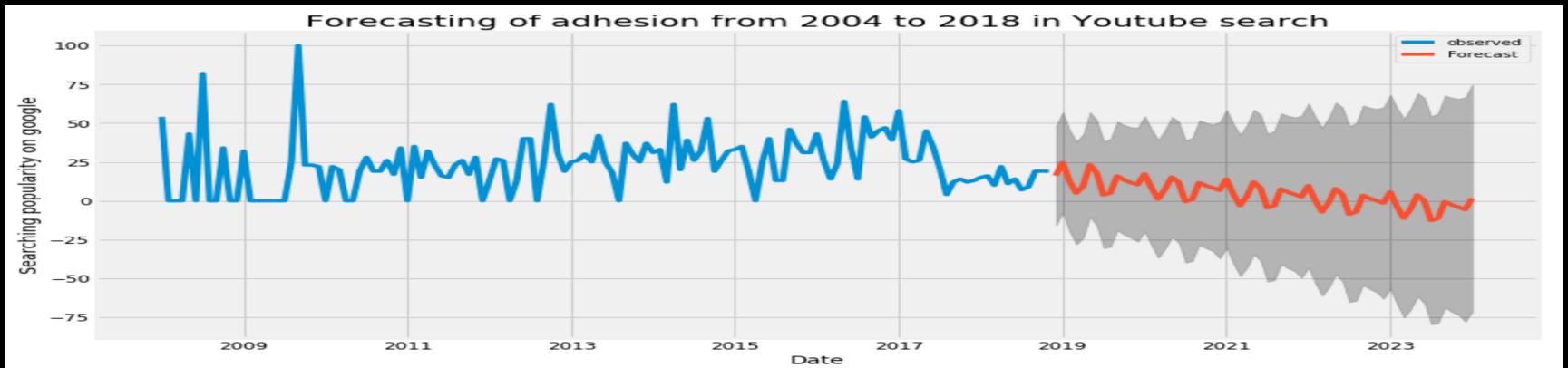
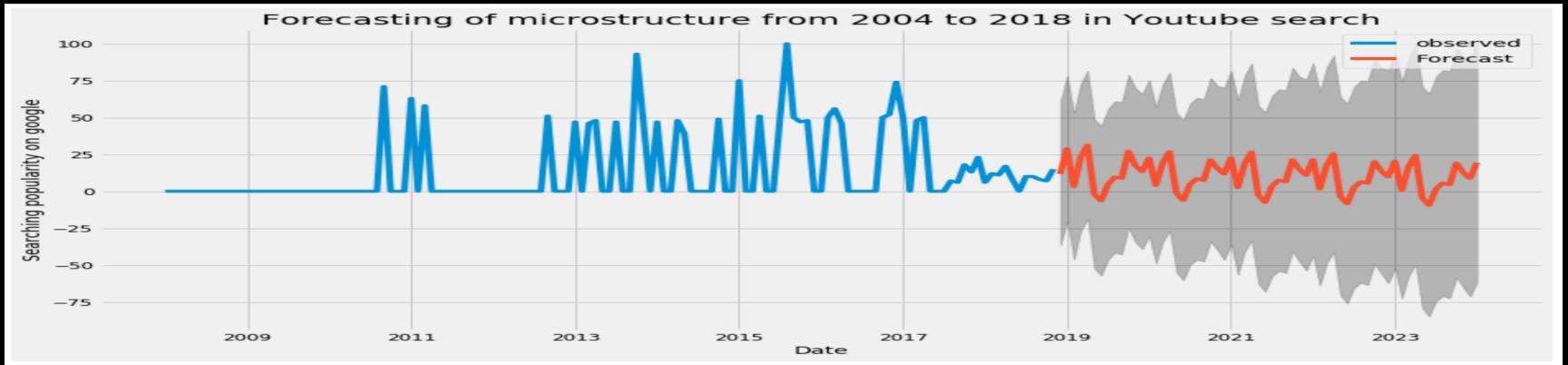
Appendices



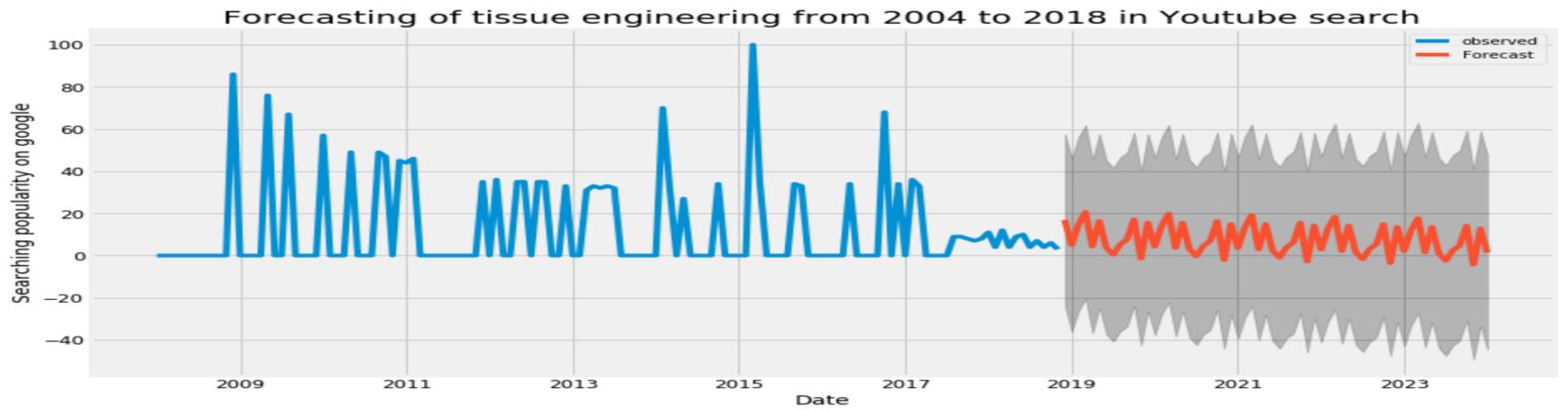




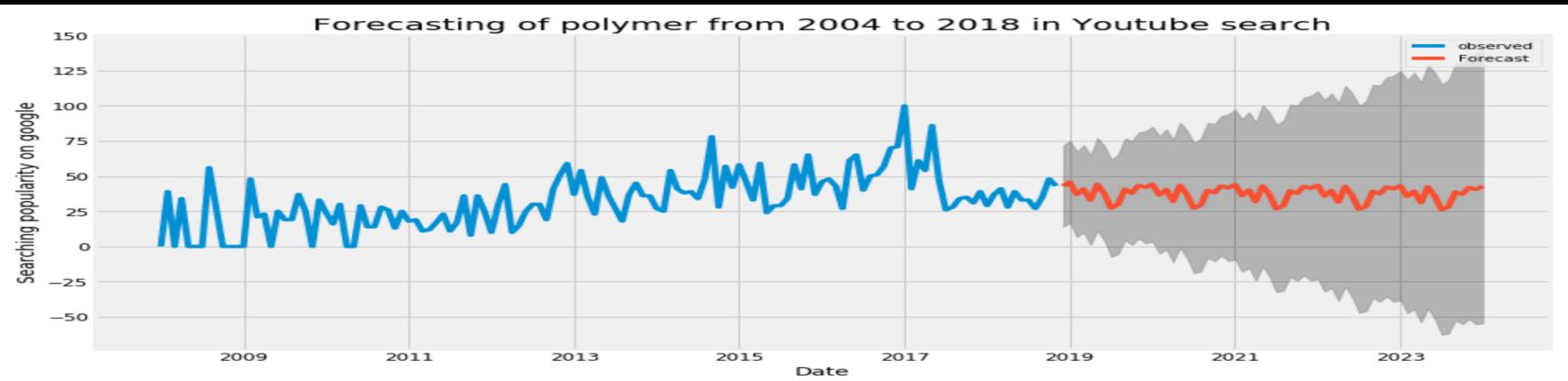




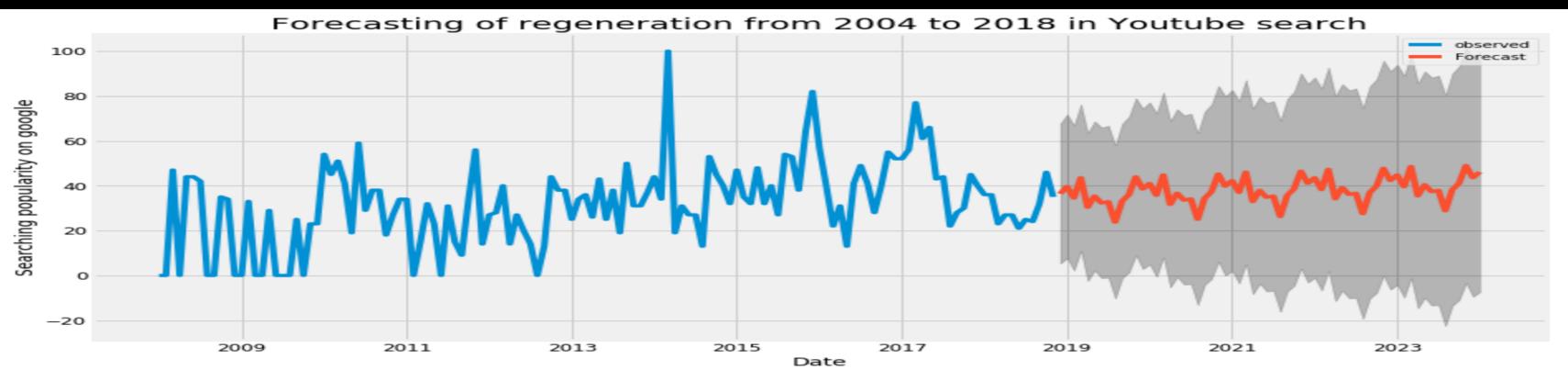
Forecasting of tissue engineering from 2004 to 2018 in Youtube search



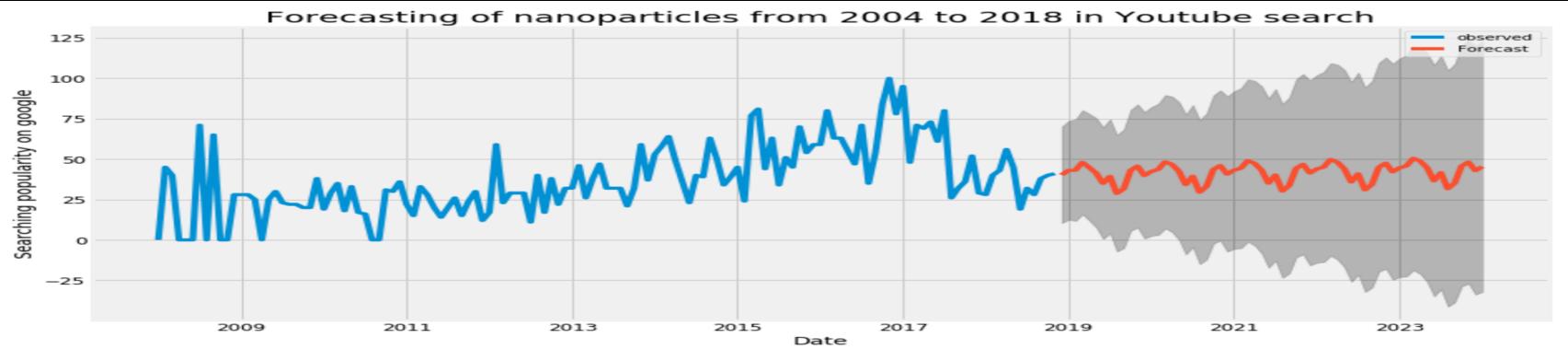
Forecasting of polymer from 2004 to 2018 in Youtube search



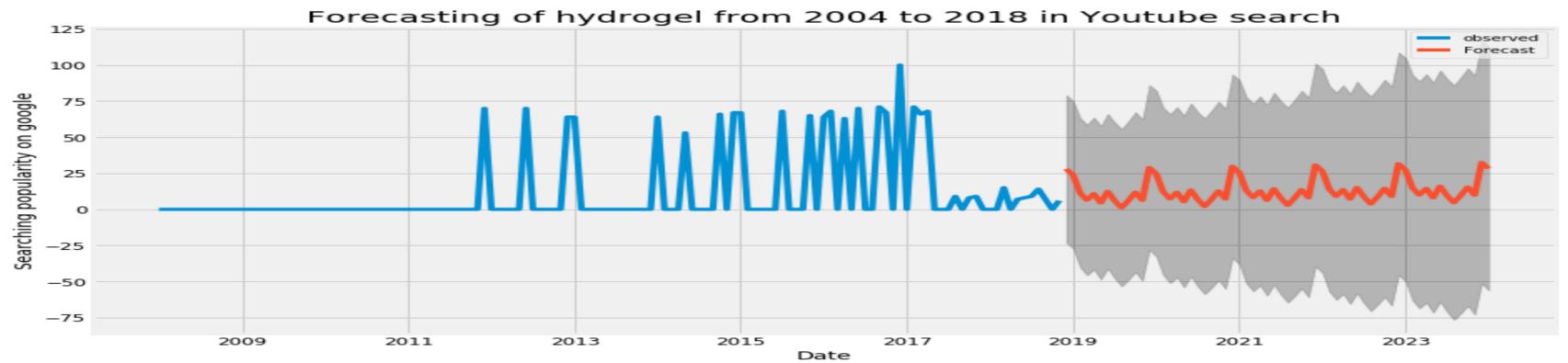
Forecasting of regeneration from 2004 to 2018 in Youtube search



Forecasting of nanoparticles from 2004 to 2018 in Youtube search



Forecasting of hydrogel from 2004 to 2018 in Youtube search



Forecasting of chitosan from 2004 to 2018 in Youtube search

