Group - 13

Hindi Poem: Poet and Era Classification

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Overview

01 Problem Formulation

02 Proposed Goal

03 Achieved Goal

04 Contribution of each member

05 Details of implementation

06 Key papers

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01

PROBLEM FORMULATION

Problem Formulation

- Much work done in English poems.

- **Our project** → An attempt to classify a given poem on the basis of Era and Poet for Hindi poems.

02

PROPOSED GOALS

Proposed Goals

- To create a database of Hindi poems using web crawling.
- Employ different models and methods to improve the accuracy of classification.

03

ACHIEVED GOALS

Achieved Goals

- Created a dataset of **50,000+ poems** from websites like **kavitakosh** and **hindwi**.
- Tested various models to get a best accuracy of **89.718%** for **era** and **32.40%** for **poets**.

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CONTRIBUTION OF ALL TEAM MEMBERS

Contribution of Team Members

- Dataset Creation → Mayank and Manan
- Merging and Pre-processing → Abhishek and Hardik
- Vectorization → Manan and Mayank
- Model Training →
  - Cosine Similarity → Mayank
  - Logistic Regression → Abhishek
  - CNN → Hardik
  - LSTM → Manan

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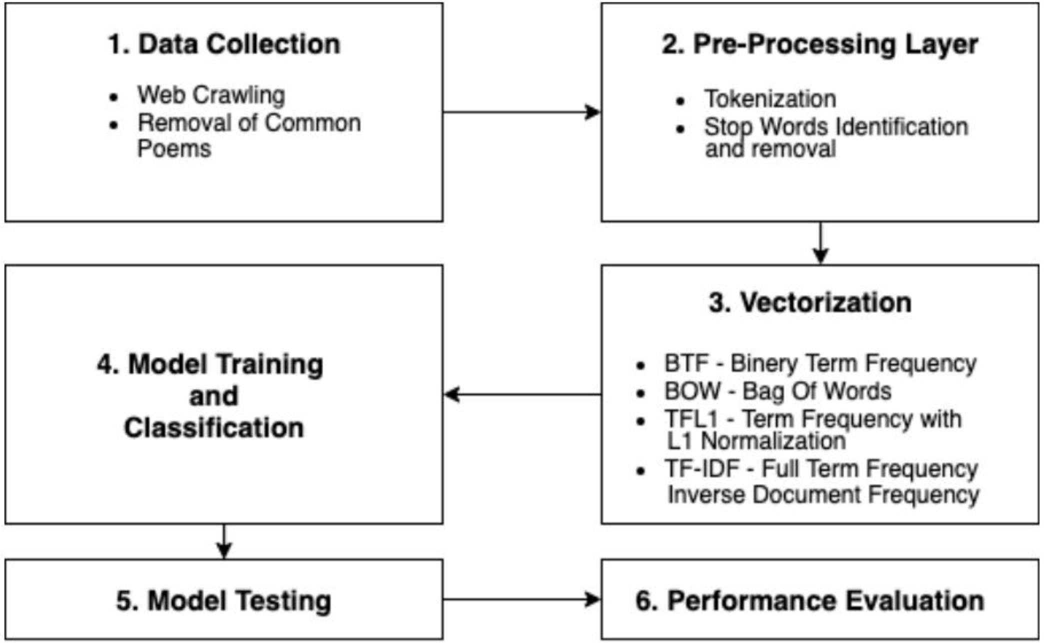
IMPLEMENTATION / ANALYSIS

Workflow of the project



1. Data Collection

- Web Crawling
- Removal of Common Poems

2. Pre-Processing Layer

- Tokenization
- Stop Words Identification and removal

3. Vectorization

- BTF - Binery Term Frequency
- BOW - Bag Of Words
- TFL1 - Term Frequency with L1 Normalization
- TF-IDF - Full Term Frequency Inverse Document Frequency

4. Model Training and Classification

5. Model Testing

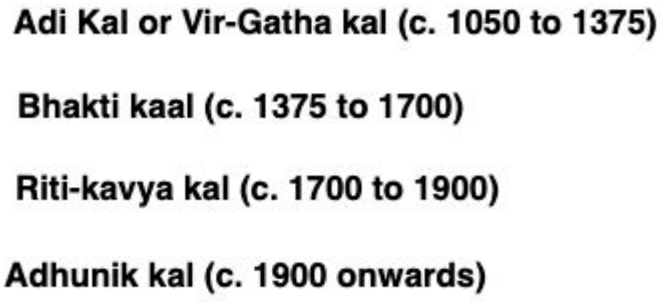
6. Performance Evaluation

Dataset Creation and Merging

- Used **Scrapy** and **BeautifulSoup** to scrap poems from **kavitakosh** and **hindwi** respectively to create a dataset of 50,000 poems.
- **Efforts** in understanding and using the libraries to build the web crawler.

Dataset Creation and Merging (Cont.)

- Dataset may contain many duplicate poems → **Merging**
- Used **year** in which poem was written for classification to create the final corpus.
  Split the poems in **9:1 ratio** to create the training set and test set respectively.



Adi Kal or Vir-Gatha kal (c. 1050 to 1375)

Bhakti kaal (c. 1375 to 1700)

Riti-kavya kal (c. 1700 to 1900)

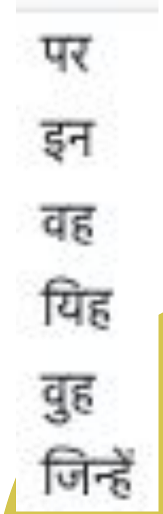
Adhunik kal (c. 1900 onwards)

Various classes of poems

Pre-processing

- **Pre-processed** the data to remove reduce noise in data:
  - Numbers.
  - Punctuations.
  - White spaces.
- Used **tokenization** to split the poems into words. (Used **iNLTK**)
- Removed stop words using 3 different sets of words for optimization.

Stop Words



पर

इन

वह

यिह

वुह

जिन्हें

Vectorization

- **Bag Of Words.**
- **Binary Term Frequency**
- **L1 normalized Term Frequency**
- **L2 normalized tf-idf**

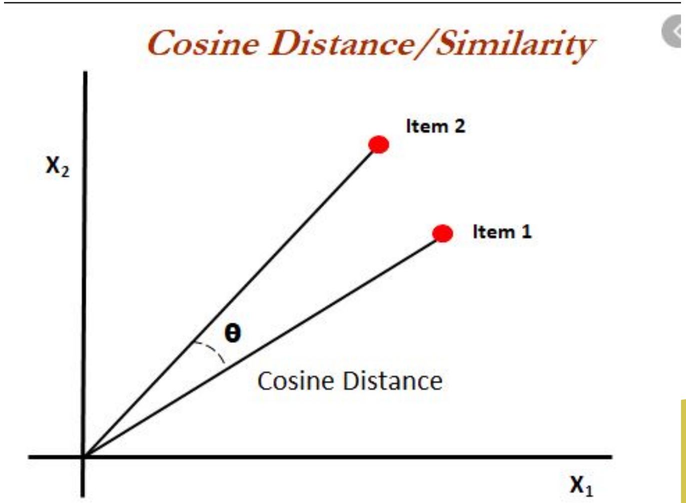
- **These techniques provide long and sparse vectors**

GloVe embeddings

- Used implementation details from https://nlp.stanford.edu/pubs/glove.pdf to create word embeddings for all the words in the vocabulary.
- Used **gradient descent** to find the minimum cost.
- Efforts in implementation and choosing different learning rates to get minimized cost.

Cosine Similarity

- Used **sklearn** to perform cosine similarity.
- For all testing data poems, found the poem in training data with smallest angle and returned its era and author name.
- **Accuracy** → **87.59%** and **16.43%** for era and poet respectively.
- Poet prediction → Why bad?
  - Maybe multiple authors have similar writing styles.
  - Same author has multiple writing styles.



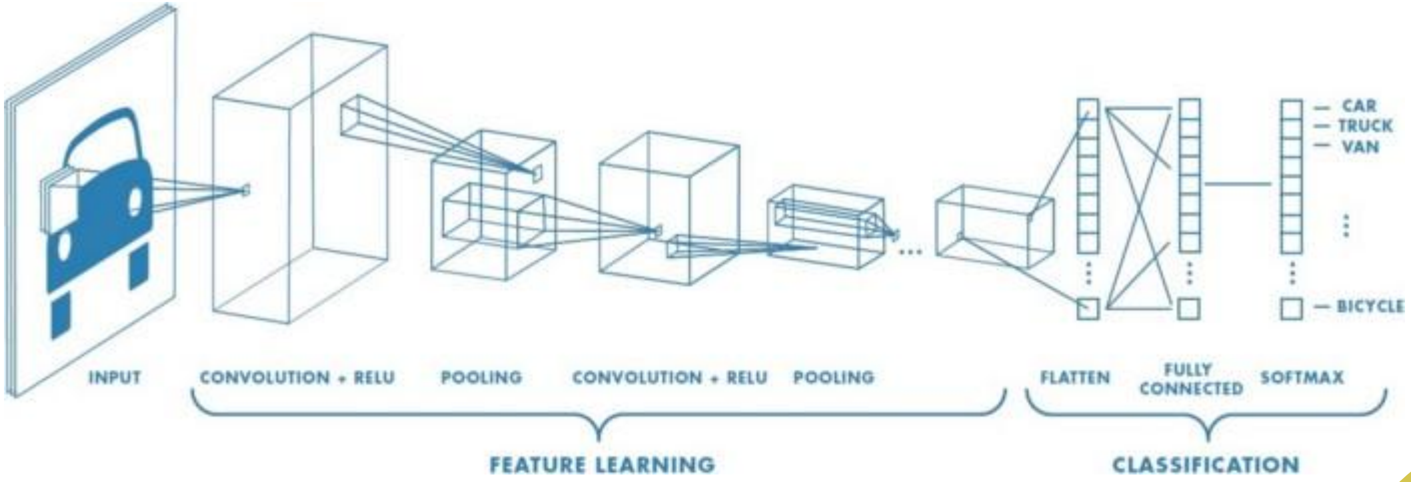
Logistic Regression

- Used **scikit-learn** library, to implement logistic regression with L2 regularization penalty.
- Tried two different implementations of it :-
  - GridSearchCV
  - RandomizedSearchCV
- **Accuracy** -> **89.71%** and **32.11%** for era and poet prediction.

CNN

- Used Keras open-source library.
- Implemented a sequential model.
- Contains Conv1D, MaxPooling1D & 2 Dense Layers.
- Parameters were tuned accordingly.
- Used softmax activation function.

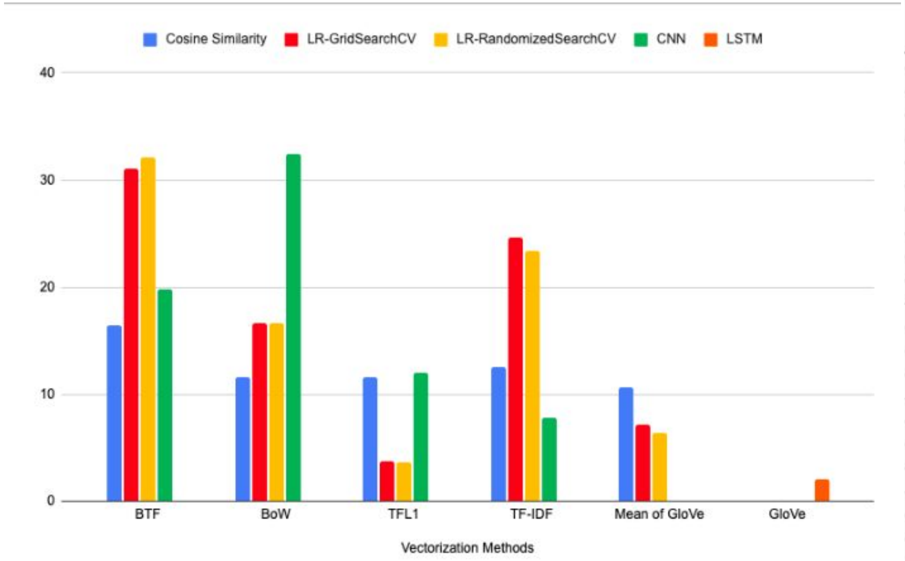
CNN - Implementation Details

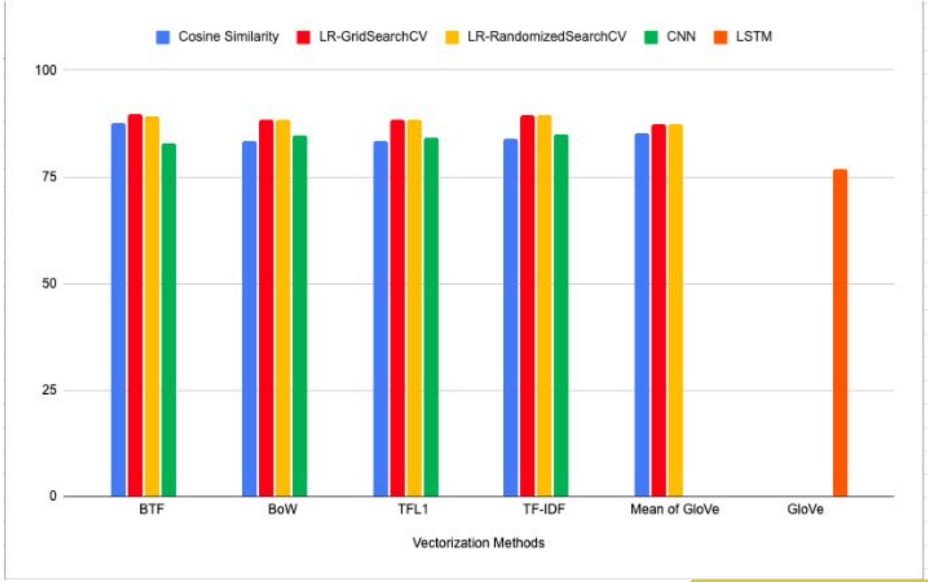


LSTM

- Used Keras open-source library.
- Implemented a sequential model.
- Contains Embedding, LSTM & 2 Dense Layers.
- Parameters were tuned accordingly.
- Used softmax activation function for final layer.
- GloVe embeddings used

Final Results





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REFERENCES / KEY PAPERS

- **Title :** Automatic poetry classification using natural language processing.
  - Year - 2019
  - Journal - University of Ottawa
  - Author(s) - Vaibhav Kesarwani
- **Title :** Automated Analysis of Bangla Poetry for Classification and Poet Identification.
  - Year - 2015
  - Journal - IITB-Monash Research Academy
  - Author(s) - Geetanjali Rakshit, Anupam Ghosh, Pushpak Bhattacharyya, Gholamreza Haffari
- **Title :** Neural Machine Translation of Rare Words with Subword Units.
  - Year - 2016
  - Journal - School of Informatics, University of Edinburgh
  - Author(s) - Rico Sennrich, Barry Haddow, Alexandra Birch

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LESSONS LEARNT

LESSONS LEARNT

01
Web Crawling
Implemented web crawlers from scratch

02
NLP
Models & making them work together

03
Expectations
don’t materialize the way we want

04
Complexity
Is not always better.

THANK YOU