Bloom Filter

May 27th, 2021

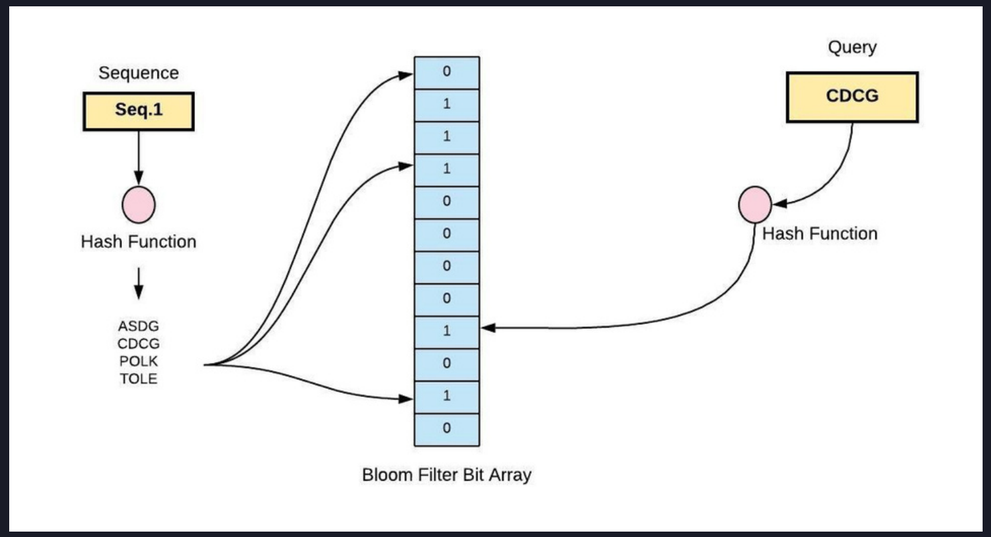
CHILD-PROPERTIES
MUHAMMAD HAMMAD MAQDOOM
HARIS KARIM LADHANI
MUSTAFA MADRASWALA
MUHAMMAD SAMEER FAISAL

NEXT

What is Bloom Filter?

It is used to test whether an element is a member of a set

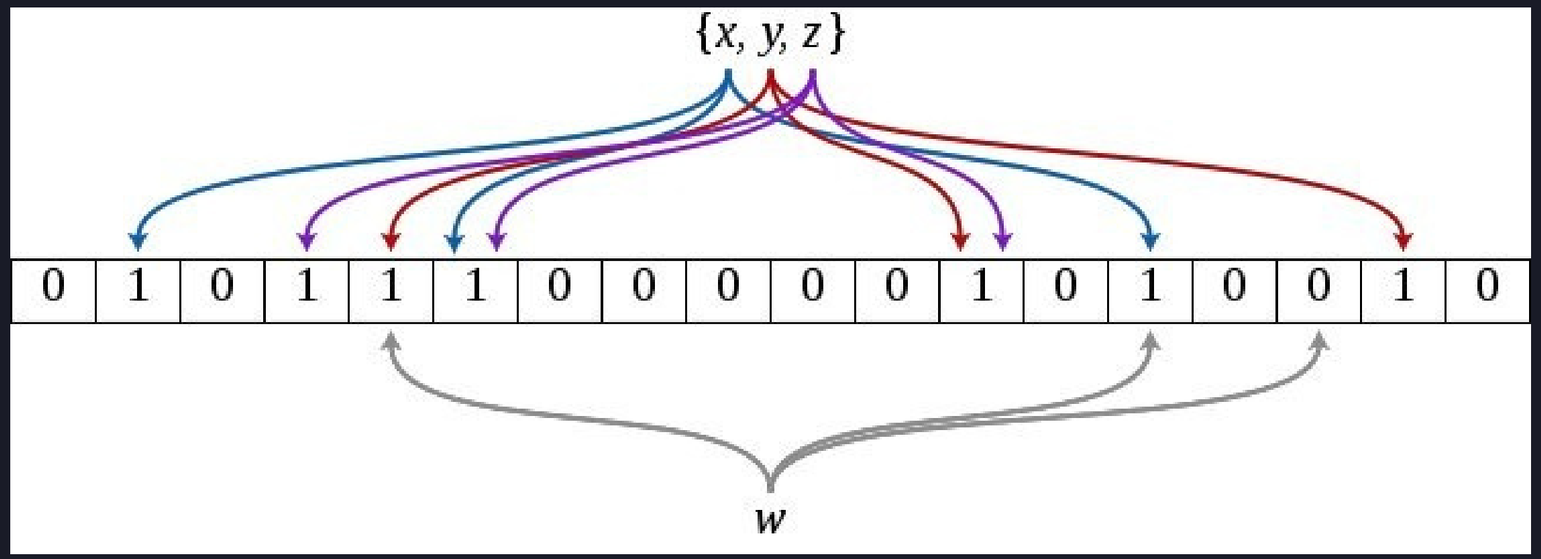
It relies on hash generation/hashing



It is a space-efficient probabilistic Data Structure

It might result in False Positives! ☹ (Its efficiency cost)

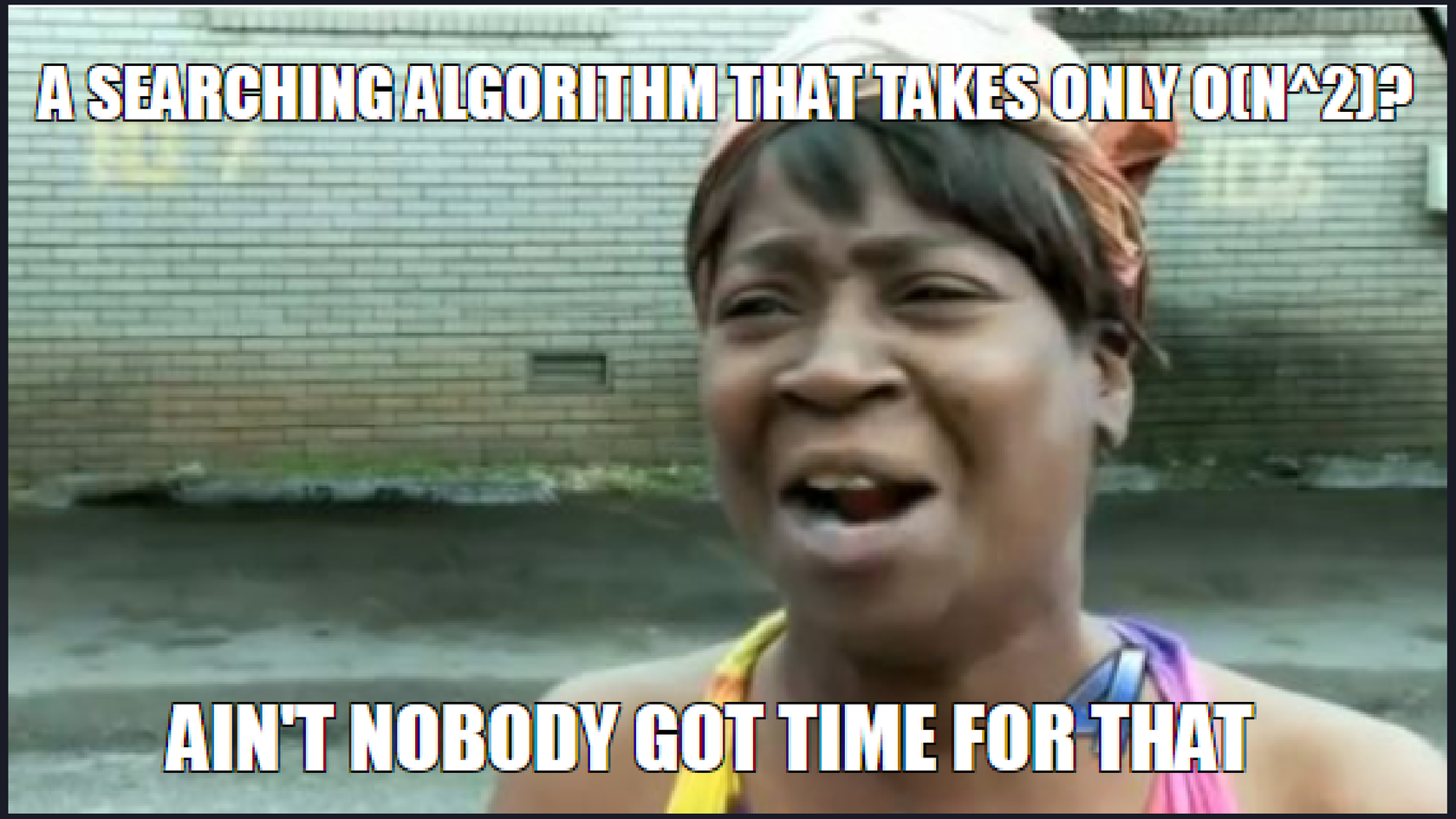
NEXT


{x, y, z}
0 1 0 1 1 1 0 0 0 0 0 1 0 1 0 0 1 0
w

What makes it unique?

Bloom Filters vs Hash Tables

- It uses significantly less space than Hash Tables
- It uses many hash functions. No Collison handling issues!
- Adding a new element or a look up complexity = O(1)
- Ideal for searching Algorithms


A SEARCHING ALGORITHM THAT TAKES ONLY O(N^2)?
AIN'T NOBODY GOT TIME FOR THAT

Where Bloom Filters don't bloom...

- Hash Tables don’t encounter any False Positives
- Hash Tables support deletion unlike Bloom Filters
- Bloom filters can't recover a string unlike BST and Tries

Where are Bloom Filters used?

- Where False Positives are acceptable but False Negatives are not
- Where space is a constraint

NEXT

Email ID registration

Movie/Video recommendation systems

NEXT

Problems

- We are using this as a searching Algorithm to make it easier to suggest movies to the user from a large database.

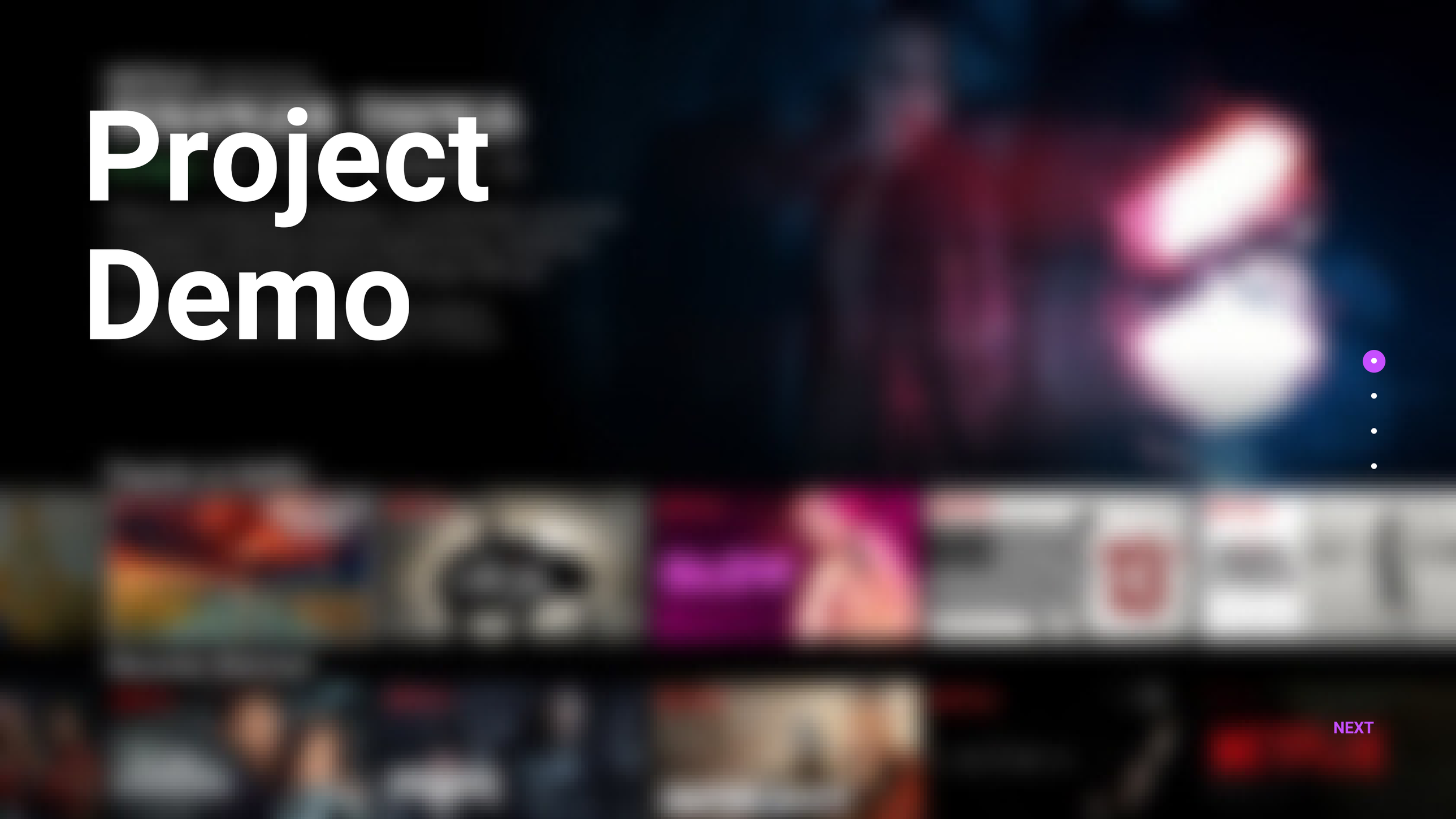
- So we will be using bloom filter in the movie searching algorithm and for the username and password when creating an account.

Application

- Creating GUI using Django Library
- So we will be using bloom filter in the movie searching and recommendation algorithm.
- We are using username and password system but we are not using bloom filter on that.

MOVIE SEARCHING ALGORITHM

Project Demo

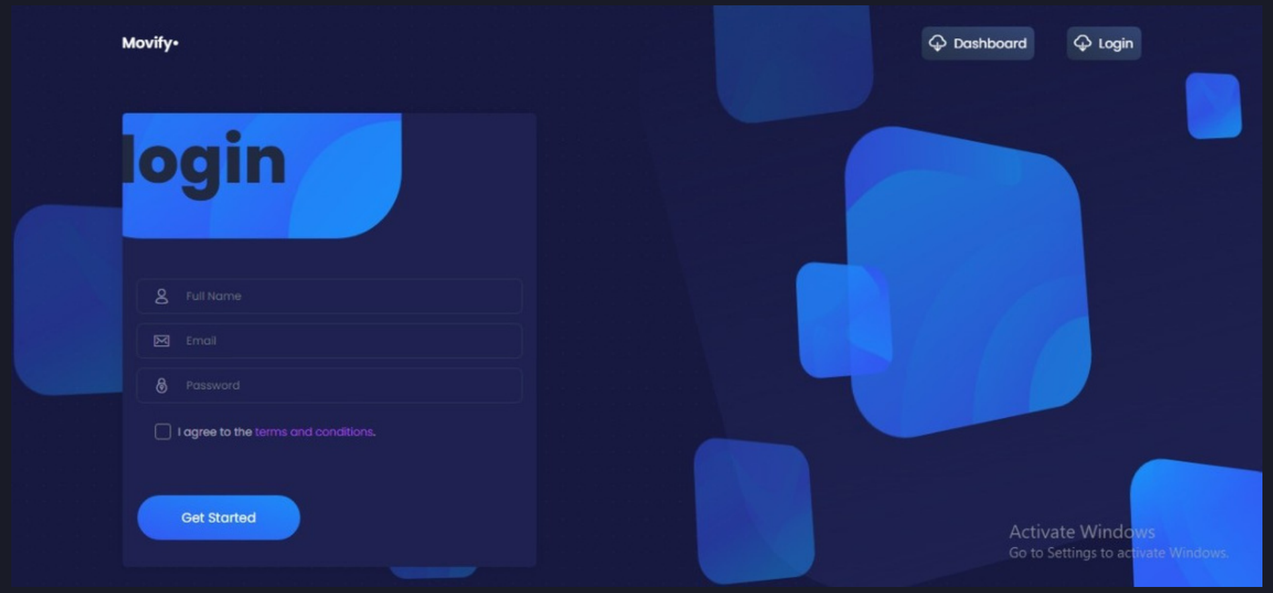


NEXT

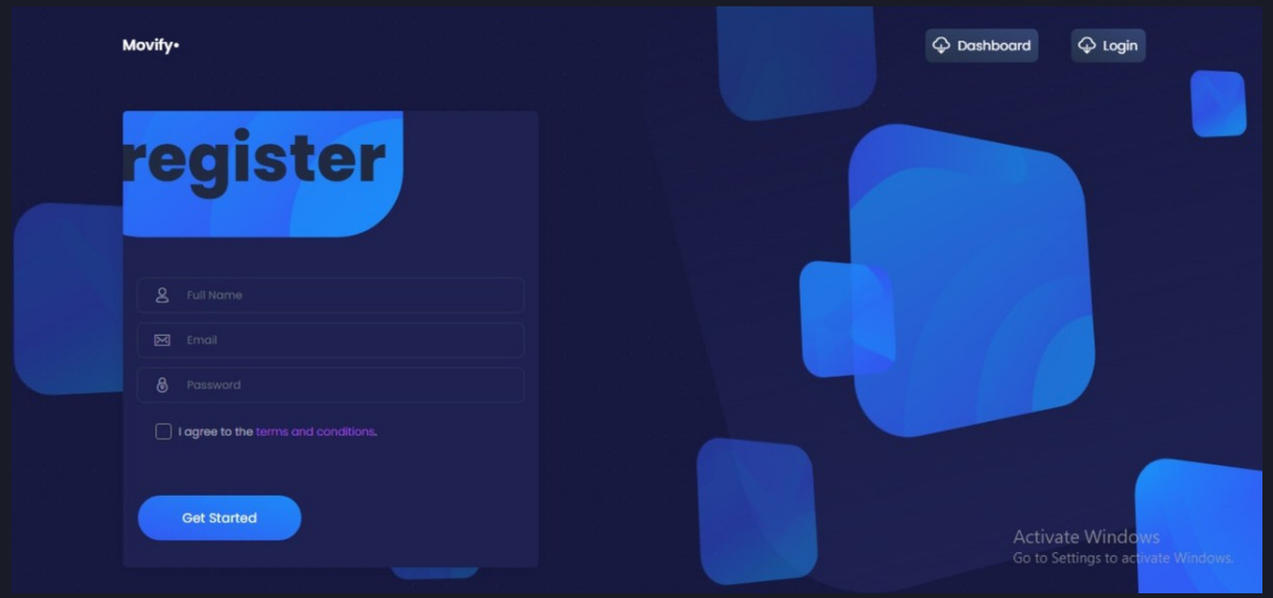
HOMEPAGE


Register
Login
Movify•
Movie Recommendation System.
Activate Windows
Go to Settings to activate Windows.

LOGIN



REGISTER



Thank you!

You can find us at:
-hl04349@st.habib.edu.pk
-mf04709@st.habib.edu.pk
-mm05534@st.habib.edu.pk
-mm05548@st.habib.edu.pk

*Link of the github repository in the description

- ***Research***

- An Examination of the Bloom Filter and its Application in Preventing Weak Password Choices
- A Scalable Bloom Filter for Membership Queries
- An improved algorithm based on Bloom filter and its application in bar code recognition and processing.

Links:

- "what is bloom filter"
  - https://www.geeksforgeeks.org/bloom-filters-introduction-and-python-implementation/
- "Practical Performance Of Bloom Filters and Parallel Free-Text Searching"
  - https://sci-hub.se/https://doi.org/10.1145/67933.67941
- "A Scalable Bloom Filter for Membership Queries"
  - https://sci-hub.se/https://doi.org/10.1109/GLOCOM.2007.107
- "An Examination of the Bloom Filter and its Application in Preventing Weak Password Choices"
  - https://www.ijcat.com/archieve/volume6/issue4/ijcatr06041004.pdf

References

- Cheng, Nancy & Rocca, Fabio. (2017). An Examination of the Bloom Filter and its Application in Preventing Weak Password Choices. International Journal of Computer Applications Technology and Research. 6. 190-193. 10.7753/IJCATR0604.1004

- Jiang, M., Zhao, C., Mo, Z. et al. An improved algorithm based on Bloom filter and its application in bar code recognition and processing. J Image Video Proc. 2018, 139 (2018). https://doi.org/10.1186/s13640-018-0375-6

- K. Xie, Y. Min, D. Zhang, J. Wen and G. Xie, "A Scalable Bloom Filter for Membership Queries," IEEE GLOBECOM 2007 - IEEE Global Telecommunications Conference, Washington, DC, USA, 2007, pp. 543-547, doi: 10.1109/GLOCOM.2007.107.