

BABRONE: A Comprehensive Database of Biotechnology and Bioinformatics Resources of North East India

Manas Sarkar, Probodh Borah
College of Veterinary Science
Assam Agricultural University
Guwahati 781022
India
manas@vetbifguwahati.ernet.in



ABSTRACT: *Biotechnology and Bioinformatics Resources of North East India (BABRONE) is the maiden approach to bring all the available information relating to these resources in a single platform.*

Till now profiles of 901 scientists have been included in the database. The profiles include details about their contact address, academic qualifications, working experience, research contributions and resources created. Detailed profile of all the universities, research institutes and colleges of the region are also listed in BABRONE, including GIS coordinates (longitude and latitude positions) of the institutions. Besides the public users, all these data are expected to be a valuable resource for the funding agencies that will help them in decision making and the discussion forum developed under this project will help in development of collaboration among the scientists and students of the region.

Keywords: Scientist Database of North East India, Institutional database of North East India, Biotechnologist, Biologist, Research Networking, Human Resource Database.

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1. Introduction

There are 19 State/Central Universities, more than 300 graduate colleges and a number of central and state government funded research Institutions in the North East Region (NER) of India. A big pool of human resources is involved in the field of Biotechnology and Bioinformatics education and research in these institutions. Most of the places of NER are hilly and remote. This region falls under the eastern Himalayas, one of the two bio-diversity hotspots of the country, known for its rare and exotic varieties of abundant flora and fauna. There is tremendous scope of undertaking research in the areas related to biotechnology in this region in order to explore and exploit its vast natural resources for the benefit of mankind. However, the scientists and

researchers of the region are generally unaware of the kind of research works being pursued in other institutions of the region due to the absence of a mechanism to bring all information in one common platform. As a result, collaboration between the institutes in this region has been inadequate in terms of knowledge and resource sharing. Funding agencies and decision makers also face problems to relate and evaluate the nature of work done by scientists of NER in order to find suitable researchers and institutions for initiating viable projects in strategic areas of research. Till date no mechanism has been developed to bring all the information in one common platform to facilitate the exchange of information and help in developing collaborations.

A scholar database is a platform where scholars can showcase their work and develop research collaborations. Different universities and organizations are trying to develop their own platform for scholar and research networking. “Community Academic Profiles” (<https://med.stanford.edu/profiles>) of Stanford University, “Columbia University Scientific Profile” (<http://irvinginstitute.columbia.edu/cusp/cgi-bin/ww2ui.cgi/splash>) of Columbia University, ResearchGate (<http://www.researchgate.net>) and Google Scholar (<https://scholar.google.co.in>) are few examples of scholar databases[1]. In India also, some initiatives have been taken by institutions like ICMR (http://icmr.nic.in/Intramural/ICMR_Institutes.html) and INFLIBNET (<http://vidwan.inflibnet.ac.in>), but none of them is comprehensive. So far no such work has been initiated in the North Eastern Region of India.

The present platform is expected to help funding agencies and decision makers to get a clear idea about the kind of research potential available in this region. Although “Vidwan” (<http://vidwan.inflibnet.ac.in>) - the database developed and maintained by Information and Library Network Centre (INFLIBNET) gives us a platform of similar kind, it has mostly focused on the basic profiles of the scientists from all areas at the national level. Vidwan cannot serve all the requirements as detailed information in respect of publications and research contributions of the individual scientists are not available in it.

BABRONE has been developed to provide a comprehensive repository of biotechnology and bioinformatics resources of the NER. It is a free online database where one can easily get all the information relating to courses offered, types of research conducted in various institutions, department level details of institutions, manpower availability, their specialization, expertise, list of publications and contact details, online and offline resources created, etc. The database is available online at www.babrone.edu.in.

An online Forum for discussions related to biotechnology and bioinformatics is also developed under the BABRONE platform. Free access has been given to students and scientists working in the related fields to initiate discussion, which will encourage exchange of ideas and views among them, and will help in troubleshooting and solving technical problems faced by students. It is expected to bring researchers and students closer to each-other for taking up collaborative works.

An e-Learning sever has also been developed under the project to help free and open sharing of learning materials and courses to facilitate the teaching-learning process in the context of modern biology, biotechnology and bioinformatics.

2. Methodologies

The web-based BABRONE database has been developed, hosted and maintained in-house at the Bioinformatics Infrastructure Facility of College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati funded by the Department of Biotechnology (DBT), Govt. of India under the Biotechnology Information System Network (BTISnet). Mostly open source and freely available software and tools have been used to develop BABRONE. The database and the front-end are hosted in a Windows 2003 Server. Apache 2.2 server with PHP configuration is used as web-server and MySql as database server. Programming languages, scripts and libraries like PHP, JavaScript, Ajax, jQuery, HTML, CSS, SQL and Foundation framework have been used to develop BABRONE. A screenshot of the web-based front-end developed is shown below (Figure 1).

The database consists of 20 tables. A schema diagram developed using MySQL workbench^[2] is also given below (Figure 2).

There are six types of user roles defined in BABRONE. The roles are -

- Administrator – Administrators are super users, with privileges to do all types of insertion and modifications.
- Institutional User – An institutional user has the privilege to insert institutional, departmental and scientists’ data of his own institution.



Figure 1. Web-based front-end of BABRONE database

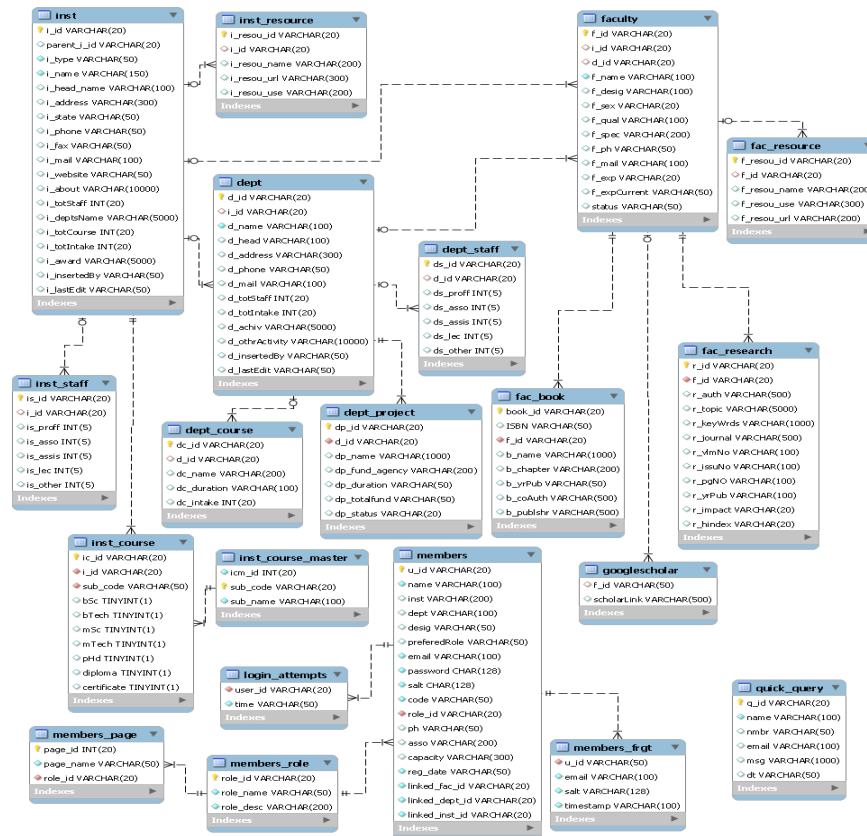


Figure 2. Schema diagram of BABRONE database

- Departmental User – A departmental user can do data entry/modification of his own department.
- Individual User / Scientist – An Individual user/Scientist gets access only to his own profile for insertion/modification/ updating of data.
- Student or Research Scholar – Students / Research Scholars are assigned a student user role. A student user has access only to the Forum section of BABRONE. However, they are not given any right to modify or insert data.

- Inactive User – A newly registered user is registered as an inactive user by default. Appropriate role is assigned after verification of the data provided by the user at the time of registration.

The Forum section of BABRONE is powered by an open source and freely available tool named “phpBB”^[3]. It is one of the popular and reliable tools available for Forum management. Registered users of BABRONE can participate in discussion in the Forum using the same log-in credentials. They do not need to create separate log-in for Forum. The user dashboard of BABRONE is protected with password, encrypted and hashed using SHA-512 algorithm and random salt of 128 bit.

Moodle is used to manage e-Learning system in BABRONE. Moodle is a free and open-source software, a learning management system written in PHP and distributed under the GNU General Public License^[4].

2.1 Data Collection

Primary and secondary data were collected for the repository from different sources. Mass emails were sent to all Biotech Hubs, Bioinformatics Centres under BTISnet and DBT funded institutions of North East India. Many institutions responded to the call and submitted their detailed information in the prescribed format for inclusion in the database. So far data pertaining to 19 universities, 21 Research Institutes, 100 Graduate Colleges and 901 scientists have been included in BABRONE. The scientists profiles has also been linked with Google Scholar ID (if available) for automatic update of available citation indices. Few scientists and students have so far used the online registration facility to include and update their own data. Till now it has 86 registered members with different user levels.

The GIS coordinates of all the Universities, Research Institutes and Colleges listed in BABRONE have been collected using online source (www.gps-coordinates.net)^[5] and presented.

3. Results and Discussion

BABRONE is a comprehensive source of information of the institutions in the NER engaged in teaching and research, their manpower as well as the research contributions in the field of Biotechnology and Bioinformatics. This resource will act as a decision support system for national and state level funding agencies, and different government entities. It will also serve as a platform for exploring scientific collaboration, knowledge sharing and problem solving for the teachers, scientists and students of the region. Till now individual profiles of 901 scientists are available in BABRONE. State wise distribution of the collected scientists’ data is shown in Figure -3.

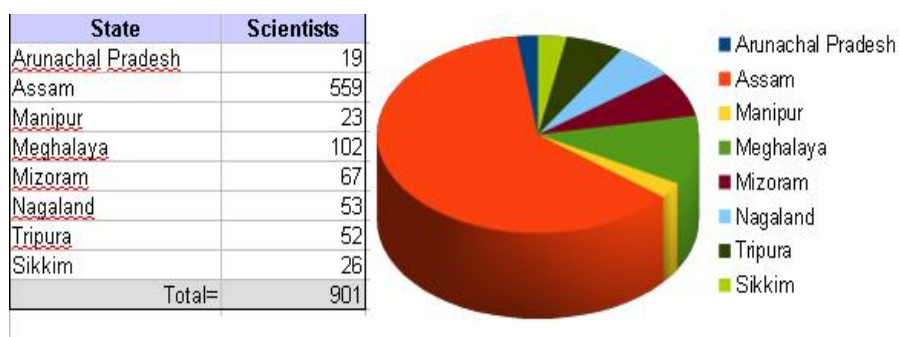


Figure 3. State-wise distribution of collected scientists’ data

A list of state-wise presence of higher educational institutes of NER is also prepared and shown in Figure -4.

All the available data are presented in easily searchable style. One can easily search data related to universities, institutes, colleges and scientists from the home page of BABRONE. The search box is enriched with auto suggestion feature to assist the user in their search terms. A keyword search with auto suggestion feature has also been developed, which helps in searching the published work of scientists in particular area based on keywords of the published work. The published work shown in the keyword search results are also linked to PubMed so that one can get access to the abstract or the full-text paper, if available. From the keyword search result page, one can also get a link to other publications of the author.

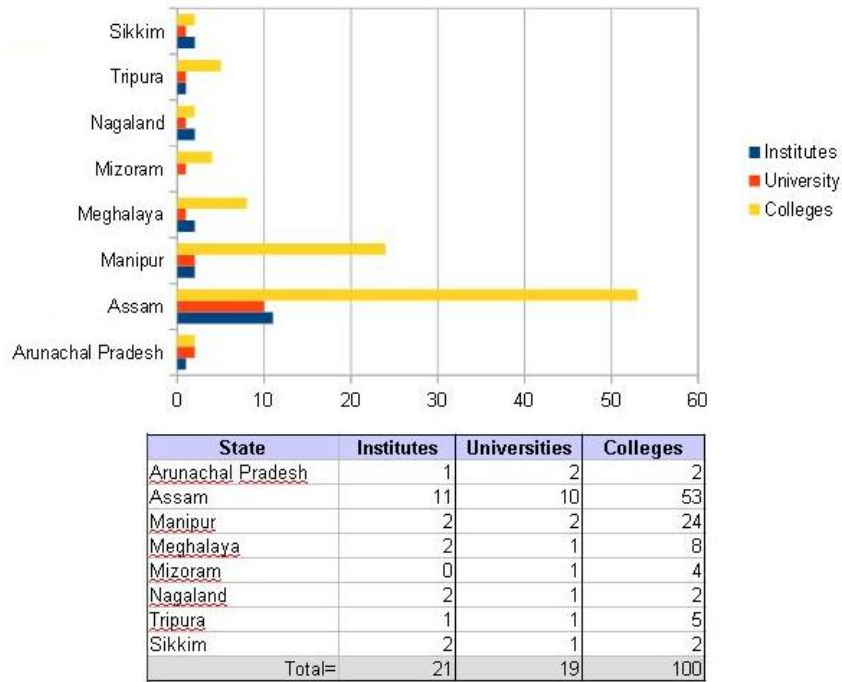


Figure 4. State-wise distribution of higher educational institutes of NER

The longitude and latitude positions of all the universities, research institutes and colleges are also listed in BABRONE. For government funding agencies, these GIS coordinates of NER universities, institutes and colleges will be helpful in the decision making process at the state and national levels. To analyze the spread of educational institutes in the North Eastern Region, DIVA-GIS⁽⁶⁾ (Version 7.5.0) was used. DIVA-GIS is an easy to use stand-alone freeware, which can be downloaded from www.diva-gis.org. Base-map data like administrative boundaries are also provided by DIVA-GIS website. A GIS-based analysis map of spread of institutes for higher education in the North Eastern Region of India is shown in Figure – 5.

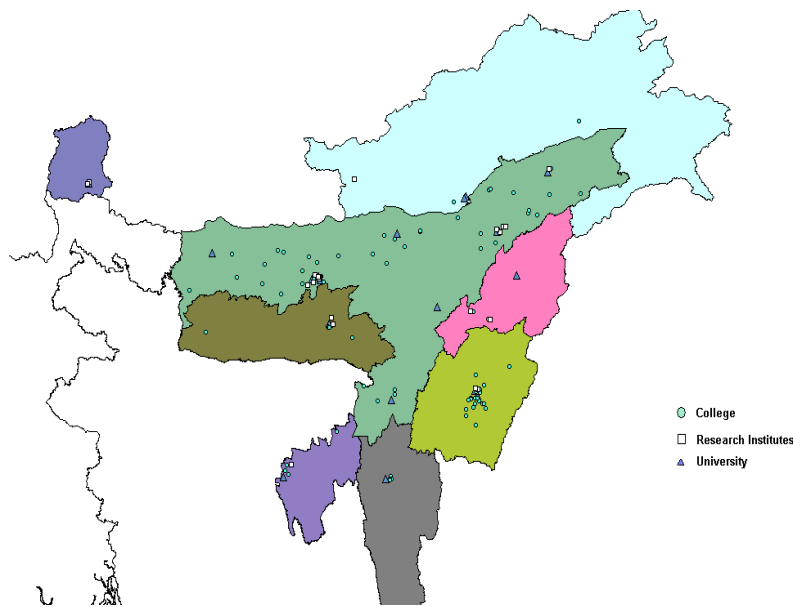


Figure 5. GIS based analysis map of spread of institutes for higher education in NER

An interactive GIS map has also been developed using Google Fusion Table^[7]. One can easily navigate to have a clear demographic view of the higher education institutes of the region. The map is accessible to all and available at <http://babrone.edu.in/map.php> A screenshot is given in Figure – 6.

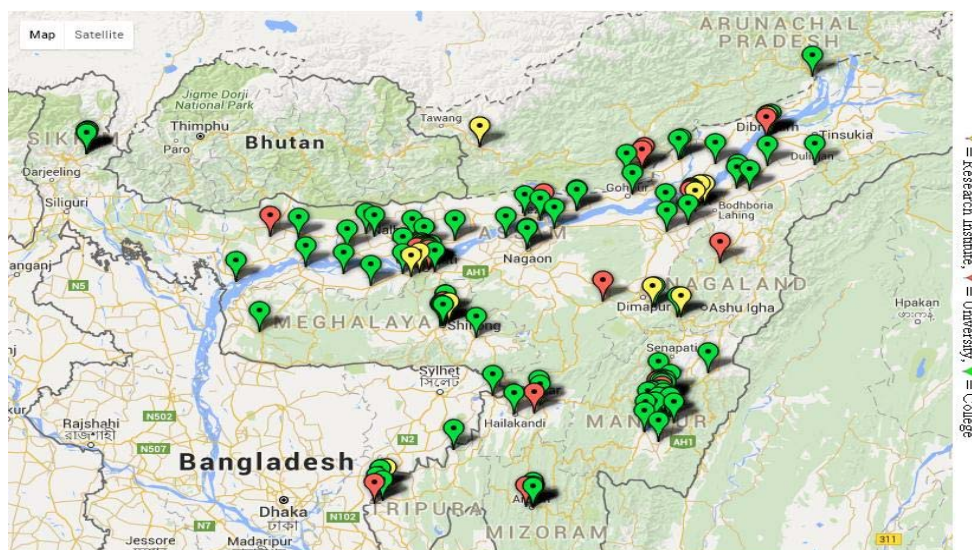


Figure 5. Screenshot of Interactive GIS map

4. Conclusion

The present work done with a view to gather and bring all the available information in one platform, for a better research collaboration, will not end with the development of the database alone. Consistent efforts are needed to bring in more and more institutions, scientists and research scholars to the platform. Data collection and update process is presently being continued. It is targeted to include all institutions and scientists of NER involved in biotechnology and bioinformatics teaching and research by the end of the current year.

5. Acknowledgment

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