Using MongoDB and Mongoose with a MEAN Stack Implementation of the NEXUS-PORTAL-DOORS System

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Introduction

For researchers, primary research is only the first stepping stone to proving or disproving a theory. One successful experiment proves little to nothing in the grand scheme of the scientific community. However, the weakness of a single experiment is covered by the power of the meta-analysis, usually completed by a third party. Meta-analysis requires researchers to analyze results from muliple primary articles and assess whether or not the result is accurate, show if the hypothesis presented are proven or disproven, and provide a degree of error. However, despite the necessity of meta-analyses, it continues to be time consuming and ineffective at connecting with all points of data. The miniscule amount of secondary articles pale in comparison to the literal thousands of primary articles which are published each day. In order to take advantage of all the new information which is provided and to create more effective secondary analyses, a semantic web solution provides the necessary tools in order to take full statistical advantage that meta-analysis offers.
In order to support PORTAL registries and DOORS directories, a database is necessary in order to support and store the data. In order to take full advantage of a tried and true framework, MEAN stack serves as the ideal system by thoroughly integrating client-side, server-side, and database processes.

Methods

For this new NEXUS-PORTAL-DOORS (NPD) system implementation, both backend and front end will rely heavily on node.js, an open-source runtime environment which enables scalable web applications and servers. Used with Express and other packages, node.js enables the user to organize a web application into a MVC (model-view-controller) architecture. In accordance with the "M" from MEAN stack, MongoDB serves as the database for the NPD. However, MongoDB acts only as a database, offering a bare minimum in regards to complex and automated queries. Mongoose enables connection to a MongoDB database from javascript, allowing model abstraction, large scale queries, data validation, and more. It also creates an SQL style database through schemas, creating a structured system in a NoSQL database.

Results

Table 1 summarizes the sample sizes and demographics for each of the selected subgroups of patients analyzed in the study cohort.

Discussion

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Conclusion

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1 References

1. Barrasa Rodriguez, J., Corcho, . and Gmez-Prez, A. R2O, an extensible and semantically based database-to-ontology mapping language Springer-Verlag, 2004
2. Berners-Lee, T., Hendler, J., Lassila, O. and others The semantic web Scientific american, New York, NY, USA:, 2001, Vol. 284(5), pp. 28-37
3. Dickey, J. Write modern web apps with the MEAN stack: Mongo, Express, AngularJS, and Node. js Pearson Education, 2014
4. MySQL, A. MySQL 2001
5. Pan, Z. and Heflin, J. Dldb: Extending relational databases to support semantic web queries DTIC Document, DTIC Document, 2004
6. Spanos, D.-E., Stavrou, P. and Mitrou, N. Bringing relational databases into the semantic web: A survey Semantic Web, IOS Press, 2012, Vol. 3(2), pp. 169-209

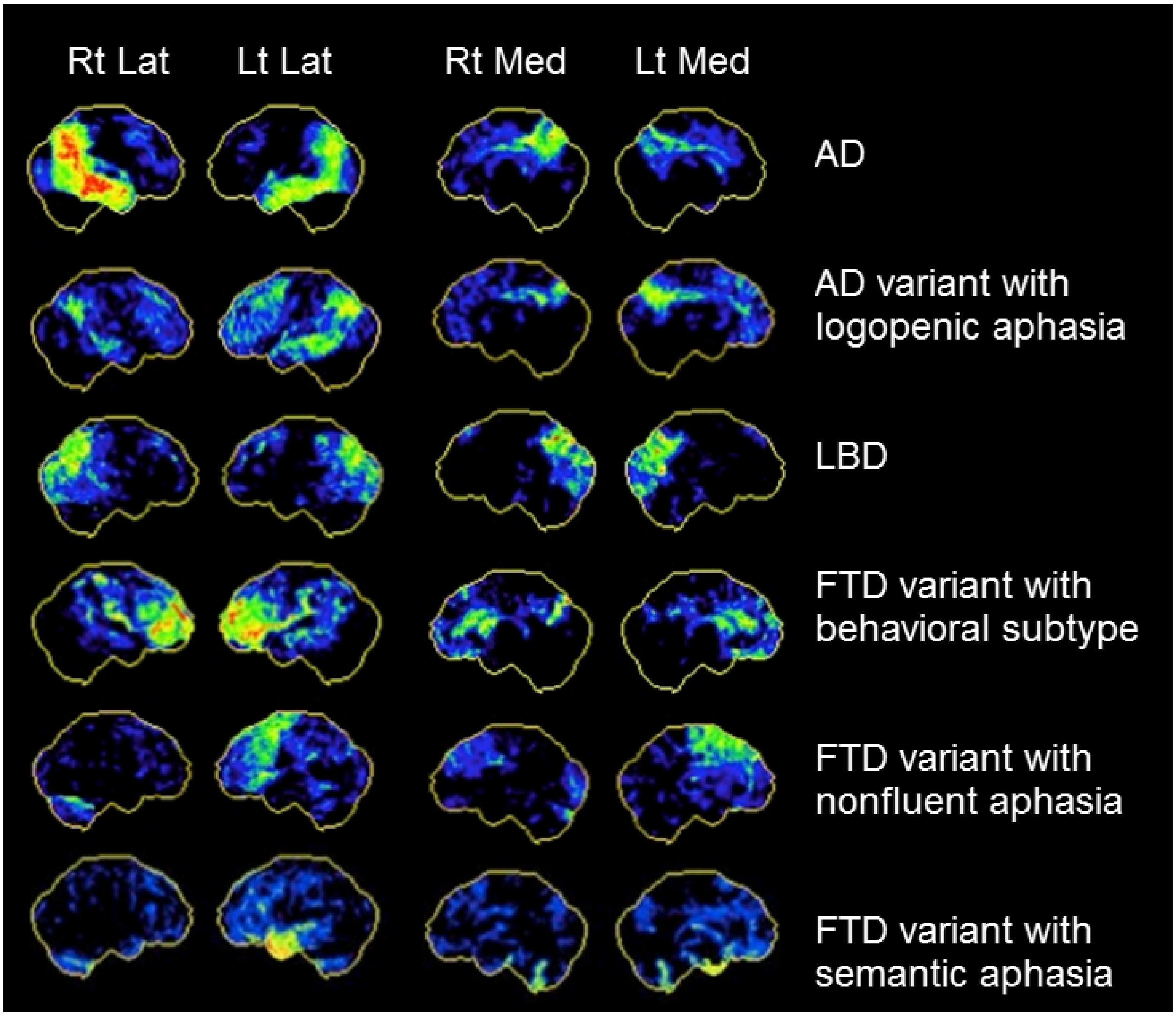

Figure 1: FDG-PET scan patterns displayed in NeuroStat 3D-SSP for focal onset dementias.

7. Stojanovic, L., Stojanovic, N. and Volz, R. Migrating data-intensive web sites into the semantic web Proceedings of the 2002 ACM symposium on Applied computing 2002, pp. 1100-1107

8. Suehring, S. MySQL bible John Wiley and Sons, Inc., 2002

9. Taswell, C. DOORS to the semantic web and grid with a PORTAL for biomedical computing IEEE Transactions on Information Technology in Biomedicine, IEEE, 2008, Vol. 12(2), pp. 191-204

10. Taswell, C. Portals and doors for the semantic web and grid Google Patents, 2010

11. Taswell, C. A distributed infrastructure for metadata about metadata: The HDMM architectural style and PORTAL-DOORS system Future Internet, Molecular Diversity Preservation International, 2010, Vol. 2(2), pp. 156-189

Table 1: Patient Demographics for Selected Subgroups in Study Cohort

Subgroup selected by diagnostic marker			Sex		Age at PET Scan	
Subgroup Id	Description	N	Male	Female	Median	Min – Max
1	C11-PiB Imaging AD	51	27	24	65	53 – 81
2	F18-FDG Imaging AD	49	22	27	65	53 – 81
3	Clinical AD	24	13	11	69	56 – 81
4	Clinical PPA-L (AD variant)	19	7	12	67	53 – 78
5	Clinical PPA-G	16	12	4	71	48 – 80
6	Clinical PPA-S	13	8	5	64	54 – 77
7	Clinical CBS	14	6	8	64	57 – 73
8 (pooled 3–4)	Clinical AD & PPA-L	43	20	23	69	53 – 81
9 (pooled 5–7)	Clinical PPA-G, PPA-S & CBS	43	26	17	66	48 – 80
10	Entire cohort	94	52	42	68	37 – 81