Autistic Savants and Mathematical sequence prediction.

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Abstract

In the third paper in a series of papers on autism savants, detection of giftedness and the use of mental arithmetic as an intervention in autism and a practice of mental wellness, we describe the use of python scripts towards primality detection exercises, of both small primes and arbitrary sized numbers and several other exercises including sequence prediction, inspired by branch prediction architectures. Sequence prediction as a mental exercise, is used as infotainment and as a wellness exercise, and a possible intervention in ASD. Several prediction mechanisms inspired by data and prediction algorithms are described.

Keywords: ASD, Autism Savants, Education For The Gifted, primality detection, data mining, basket of associations, sequences, branch prediction, plotting graphs.

NumWorks Calculators as a Math-Code Gym

Method

Sequences inspired by branch prediction predicates.

Branch prediction is based on the theory that a history of branching predicates can be used to predict the next branch outcome to various degrees of prediction accuracy. In this mental exercise, the gym user uses several mental techniques described to help predict the next branching predicate, and the reaction times and the prediction accuracy are collected.

Common predicate based prediction systems are reviewed in ⁵, static and dynamic prediction architectures.

Many architectures called two level predictors are based primarily on m - history and pattern detection, leading to two mental exercises, memory retention of m - history and pattern detection in a given stream, followed by the mental application of pattern detection towards prediction of the next branching predicate.

In this exercise we recognize repeating patterns in branch patterns, starting with $n=2$ and increasing n , to larger patterns.

Design Of Proposed Experiment (D.O.E),

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Variables: response time for correct responses, response time for incorrect responses, number of correct responses, number of incorrect responses in prediction accuracy.

Number of patients and control group.

The control group consists of 100 participants, using this skill as recreational mathematics and as a learning and cognition tool. The tool is also used to detect 'savant' characteristics based on response times and number of correct and incorrect responses.

Instrument Reliability

1. Inter-rater reliability
2. Test-retest reliability

Validity

1. Face validity
2. Construct validity

Use of R and the Laavan software, for the assessment of reliability and validity measures.⁶. We use the Laavan software to determine inter-rater and test -retest reliability and variance based validity measures, of both face and construct validity measures, published when the clinical trials are committed.

Model for the evaluation of prediction score and reaction times.

⁷ is epistemological on models of mental arithmetics with a progression from procedural to network models.

Reaction times are proven irrelevant to the quantification of mental arithmetic to indicate 'savantness', however reaction times and statistics are part of the data set collected, for future research in data mined correlations in reaction times. In this publication we use a fuzzy mapping to the primality detection numbers, to measure 'savantness'.

Discussion

Learning and Cognition models, with models for interpreting reaction times, allow for the determination of a fuzzy variable to a quantitative measure belonging to the gifted category, needing special education electives and tools, the math-code gym.

Reaction times form an important assessment in learning models and models of memory, but in the case of quantitative assessments in assessing measures of giftedness in mathematical capabilities, the author argues against the need for reaction times in a quantitative evaluation of giftedness. Savantness has little to do with reaction times, but more with different abilities, with no bias of testing reaction times or a time based framework. Hence recording the reaction times would be optional in the math and code gym. With only the accuracy, much like an IQ test of consequence, the number of correct and incorrect responses is used in a quantitative assessment of giftedness.

The standard covariance and reliability measures of the fuzzy variable are determined with SEM models using the Lavaan package in R, as described in previous work.⁴

Future work includes a number of branch prediction algorithms commonly found in present superscalar architectures, which adds to a users knowledge of computer architecture, ML⁸based prediction mechanism and the nature of branching sequences forms future exercises in the math - code gym.

References

1. NumWorks Workshop. <https://workshop.numworks.com>.
2. Technical specifications. <https://www.numworks.com/specs/>.
3. Bheemaiah, A. K. Autistic Savants and prime number identification. doi:10.31234/osf.io/c3asn.
4. Bheemaiah, A. K. Autistic Savants and large number primality detection.
doi:10.31234/osf.io/2cmqp.
5. [No title]. <https://acadpubl.eu/hub/2018-119-15/2/302.pdf>.
6. [No title]. <https://cran.r-project.org/web/packages/lavaan/lavaan.pdf>.
7. The development of mental arithmetic: A chronometric approach. *Dev. Rev.* **2**, 213–236 (1982).