

# Application of SDA-03 (*Software detection Autism-03*) to Detect Autism Children Disabilities in the Early Age

1<sup>st</sup> Ricko Irawan

*Department of Health Physical Education and Recreation*

*Faculty of Sport Science, Semarang State University*

Semarang, Indonesia

rickoirawan@mail.unnes.ac.id

**Abstract—Background of this study is most of parents know their children had autism since in elementary school even junior high school, whereas autism can be detected early, delayed in identifying autism children cause difficult and complicated disease to be cured. The result of this study is software product named SDA-03 which answered 23 questions directed at children to be analyzed, and if the child is identified having autism symptoms then software will automatically give recommendation that child has autism symptoms.**

**Keywords—autism, disabilities, early age, SDA-03**

## I. INTRODUCTION

Autism can happen to anyone, regardless of race or family background, such as social status, economic, and education. Autism is a developmental disorder that can be detected early on. Therefore, it is important for parents to be sensitive to any abnormalities that children show in their development so they can be dealt with immediately and reduce the risk of disturbing later developments [7]. The results showed that of a total of 64 autism children who studied, most aged 7-10 years of 30 children. This disorder is more common in men (59.6%) than women (40.4%) [4].

According to Rini [17]. Research in Banyumas Regency Most of the growth of toddlers (83% of respondents) is normal. Most childhood development (83%) according to age. Eighty-eight percent (88.7%) or most toddlers have no emotional mental problems. The majority of respondents also had low risk of autism which was 50 respondents (94.3%), and most respondents did not have attention concentration and hyperactivity disorder as many as 48 respondents (90.6%).

SLB C Semarang is the educational foundation for children with special needs which is located on Alfa Raya Street Number 3 Perum Alfa Permai, Klipang, Semarang Central Java. The number of students who have autism disorder in this school became special attention for the writer to create an application program that can detect early for children with this disorder. According to Leo Kanner [6]. one factor that causes autism is a genetic factor. One third of family autism member have disorders, that is if their parents

have autism, the risk of 60% children with autism, on the twins if one has autism then 70-80% of his brother has autism. It is confirmed that if the child has autism disorder, then the parents have congenital / carrier autism in their children. It is indicated that parents in SLB C Semarang could also lose the autism disorder to their other children or in the other words, children who have autism disorder at SLB in the Semarang City, her siblings could also have similar disorder.

Early detection of autism, followed by appropriate interventions or corrective actions will largely determine future and future child development. There are several things to note because it may indicate a developmental disorder, including symptoms of autism. If the child does not get autism treatment, the condition of autism will be permanent [11]. Do not let the child lose the golden age to grow and develop optimally the presence of late detected autism disorder until intervention was delayed too late and the problems faced by children more difficult to decompose. Finally the future of the child is at stake.

Seeing the problems above, the researcher is interested in making a product in the form of an application called "Software Detection of Autism-03", here the application contains of software that can detect children in the early age who have disorder or autism symptoms.

Meanwhile, Application according to *Indonesia Dictionary* [2]. "Application is the implementation of system design to process data that uses a rules or provisions of a specific programming language". In terms of application is a ready-made program that created to perform a function for users or other application and it can be used by the intended target.

The range of children in the early age according to Article 28 of UU Sisdiknas Number 20 year 2003 paragraph 1 is 0-6 years. Meanwhile, according to scientific study of PAUD and its implementation in some countries, PAUD is conducted since age of 0-8 years. From the explanations above and refer to this study, it can be concluded that children's age which referred in this study are children in age of 1-3 years.

## The Novelty of Research Results

This study was designed on the basis of previous research, the following are previous research became a benchmark in designing this study:

1. The research of Diane L. Robins et al. It used M-Chat method (*The Modified Checklist for Autism in Toddler*) is a list or checklist containing some questions to detect autism on child in age of 16-30 months. M-Chat was developed by Diane L. Robins et al. in the form of written questions in checklist.
2. The research of WHO in 1993, used the checklist contained in the ICD-10 (International Classification of Diseases-10) is an autism diagnosis system established by WHO.
3. The research of DSM-IV in 1994. Besides WHO, United States Psikiatri Association also compiled the outline as a guide to establish autism, called DSM-IV (Diagnostic Statistical Manual). Basically, diagnosis of autism are enforced based on ICD-10 and DSM-IV indicated the same criteria.
4. CARS (*Childhood Autism Rating Scale*), is a scale rating of childhood autism. CARS was made in the early 1970 by Eric Schopler [10], which is based on behavioral observation. The tool used scale up to 15 children evaluated based on its relationships with the people, the use of body movements, adaptation to change, listening ability as well as verbal communication.
5. *The Autism Screening Questionnaire* [9], is the checklist consist of 40 scale items, which are used for children in age 4 years to evaluate their communication and social ability.
6. *The Screening Test for Autism in Two-Years Old* (STAT), is a screening autism test for age 2 years. This screening test was developed by Wendy Stone based on 3 areas of the child's ability, which is play, motor imitation, and concentration.
7. Sri Muji Rahayu [10]. Handling children with autism if handled faster, the faster the handling. And children with autism can be detected before the child reaches the age of 3 years.
8. Aji Setiawan [1]. Autistic Child Detection Expert System is made so that parents can get information quickly and accurately so that it can recognize the symptoms - symptoms of autism and able to handle it yourself without having to meet with experts directly.
9. Arie Qur'ani [12], Symptoms of autism can be detected early through interference seen in aspects of behavior, communication, and interaction from the age of 4 months.
10. Yoanita [13]. The classification system is using Naïve Bayes method by comparing the probability result for each three category (aloof, passive, active but odd). For Naïve Bayes's weakness is solved by add-one smoothing method so that the probability of Naïve Bayes to a target based on the existing symptoms.
11. Siti Nurul Khoiyah [14]. In his research produced the software Detection of autism in children. This system is able to detect as many as 5 disorders accompanied by symptoms of disorders, causes, suggestions and the value of certainty from the results of detection. The results of tests conducted directly on the expert child and user, indicating that the application is feasible and usable.
12. Edwar Budiman [15]. Autism is divided into three types of autism class mild, moderate, and severe according to the condition of people with autism. In doing detection of autism it can use linear discriminant analysis (LDA) method to get good accuracy result. Using 75 training data, the system can produce an accuracy of 88%.
13. Hendita Artha Kusuma [16]. In the Autism Identification System has the ability to identify autism for children aged less than 8 months to 5 years, which can help parents to make early diagnosis. In addition Psychiatrists can use this system to make it easier to identify autism quickly.
14. Suryaningrum [18]. Based on the results of the study it can be concluded that as many as 7 respondents (3%) know the Children Needs Special assessment and as many as 242 respondents (97%) did not know the assessment for the crew. In addition, the problems of early childhood teachers are difficult to make early detection when entering early childhood and have difficulty to communicate with parents, not understand how to handle ABK, and the difficulties of children crew enter school to the next level.
15. Gusti [19]. The results of this study is to create an application that aims to facilitate parents diagnose children with symptoms of autism.
16. Budiyanto [20]. Naïve Bayes Method is the method for this expert system. The methods will diagnose the children with autism and classify the autism categories to be low autism, medium autism, or high autism. There are 33 autism symptoms that the systems will process it. After being tested, the expert systems can diagnose children with autism the same as the expert's (psychologist) diagnose.

In the application of SDA-03 developed by researcher, researcher tried to enhance the research that has been done in previous studies, in order to give a better color by modifying and adding some items. Application of SDA-03 is basically almost same with other research, but the difference is in manual system became computerized system. In the previous product used manual system in the form of question or checklist. SDA-03 products is product or Software created by way of answering the question "yes" or "no" that consists of 23 questions listed in the program then the conclusion will be drawn automatically whether the child contracted autism symptoms or not. This application is to detect children with symptoms of autism at the age of 1-3 years. The technical operation of SDA-03 application is

parents or teachers give answers to the questions in the application which are integrated based on observations made on daily children's behavior.

**II. MATERIALS AND METHOD**

This type of research in this first stage is quantitative research where the developed product would be seen its effectiveness. Software Detection system of Autism-03 uses waterfall method, which consists of: 1) *analysis*, 2) *design*, 3) *coding*, 4) *testing/verivication*, 5) *maintenance*.

This research is developmental research or research and development. Developmental research is research that aims to develop new products or refine existing products. The steps of this developmental research by using Borg & Gall models [3].

The technique used by purposive sampling is by determining the sample based on predetermined criteria of SLB C children with autism disorder.

After doing the analysis, so the researcher conducts the developmental model or product by doing test that have been compiled before. After the model is created then the next step is a test of the variables which already determined by researcher in order to ensure the success of the product that would be created.

Small-scale trials are conducted at SLB Pekalongan with 15 parents of children with autism children, and large-scale trials are conducted at SLB C Semarang with 52 parents. The researcher get those samples from recommendation of his friends who work in both of that schools.

After the variables tested, the variables are analyzed and validated from three experts; psychologists, occupational therapists for children with special needs (ABK) and expert of practitioners adaptive of physical education. In addition, components of the test results are also analyzed by using statistical analysis of T-test and F-test. The features of

Software Detection of Autism-03, that are:1) able to detect children with autism using a questionnaire, 2) Accommodates the data results of the questionnaire, 3) parents could assess in many times

**III. RESULT AND DISCUSSION**

Software Detection of Autism-03 is web-based application that is used to detect children autism early. Autism is a mental disorder that is quite difficult to identify, for it is by using a web-based identification system that can help parents to identify autism in children as early as possible so that parents are not wrong in handling [5].

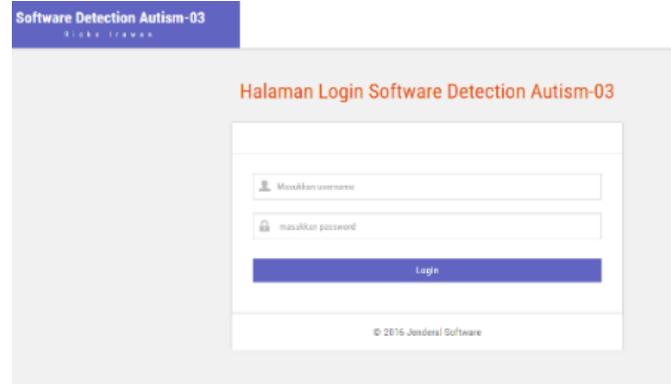


Fig 1. Front Page of *Software Detection Autism-03*

Software Detection of Autism-03 web-based and also mobile is system that is built with web-based technology and also mobile, now to be able in accessing this system, the visitors can access by using web address: <http://smanbanyumas.net/pakar> and on android mobile phone uses Software Detection of Autism-03 in apk format.

TABLE 1. THE USER OF SOFTWARE DETECTION AUTISM-03

No	User	Needs
1	Admin	<ul style="list-style-type: none"> <li>- Login to system</li> <li>- View the questionnaire results</li> <li>- Input of the user data</li> <li>- Update the user data</li> <li>- Delete the user data</li> <li>- Search the user data</li> <li>- Input the category data</li> <li>- Update the category data</li> <li>- Delete the category data</li> <li>- Search the category data</li> <li>- Input the question data</li> <li>- Update the question data</li> <li>- Delete the question data</li> <li>- Search the question data</li> <li>- View the questionnaire format</li> <li>- Update data on system</li> <li>- Logout from system</li> </ul>

2	Parent/ Teacher	<ul style="list-style-type: none"> <li>- Login to system</li> <li>- View the questionnaire results</li> <li>- Conduct a questionnaire either new or reconfigured</li> <li>- Logout from system</li> </ul>
---	-----------------	---

The question instrument consists of 23 items, where in the autism diagnosis can be enforced if there is minimum number of symptoms of three (3) wrong answers. It mean three answers identified have autism disorder. Table 3 shows the indicators/questions of Software Detection Autism-03 application.

TABLE 2. QUESTIONS INSTRUMENT OF SOFTWARE DETECTION AUTISM-03

No	Question	Yes	No
1	Does child like to play with his friends?	v	
2	Does child like cuddled or swung?	v	
3	Does child like to climb(stairs, chair, or table)?	v	
4	Does child like cilukba game?	v	
5	Does child ever talk to the doll, become a specific figure, or talk in telephone?	v	
6	Does child ever use the forefinger when he/she wants something?	v	
7	Does child did not dropped away when given toys?	v	
8	Does child ever bring objects and shown to you?	v	
9	Does child see your eyes 1 or 2 seconds when invited to joke?	v	
10	Does child smile when you invite him/her to smile?	v	
11	Does child imitate you if you make some specific face?	v	
12	Does child give reaction if his/her name is called?	v	
13	Does child respond when you pointed a toy in a particular side of the room?	v	
14	Does child in age 2,5 years can able to walk?	v	
15	Does child look at things you look?	v	
16	Does child trying to find your attention to the activity he/she is doing?	v	
17	Does child understand to what the other said?	v	
18	Does the child look at your face (want to see your reaction) when faced with an unfamiliar situation or he/she does not understand	v	
19	Does child refuse to be hugged?		v
20	Does child can not play with peers?		v
21	Does child like stuffed toys to his/her mouth?		v
22	Does the child did not look when it is invoked (ignorant) cry and laugh for no reason?		v
23	Does the child less vivid expression?		v

**AUTISM DIAGNOSIS CAN BE ENFORCED IF ALL THE MINIMUM NUMBER OF SYMPTOMS IS 3**

**IV. CONCLUSION**

**A. Conclusion**

Based on the results above, it can be concluded that Software Detection of Autism-03 is an easy and effective media to be used by parents and teachers to detect autism children since early age of 1-3 years. It can be used in android application.

**B. Suggestion**

Parents should consult to a doctor, specialist or psychologist if their children are identified autism symptoms as soon as possible and should do Prevention of autism children as early as possible in order to provide positive intevention so that in the future the growth and their development could be optimized.

**REFERENCES**

[1] Aji Setiwan and Dwi Kuncoro. Expert System Expert System Of Autis Children. IEEE Transl. Journal Ilmiah Go Infotech, vol. 22, pp. 1–7, December 2016.

[2] Alwi Hasan, dkk. (2005). *Indonesia Dictionary*. IEEE Transl. Jakarta : Departemen Pendidikan. Nasional Balai Pustaka.

[3] Borg. W.R. and Gall, M.D. (1983). *Educational Research: An Introduction*. IEEE Transl. New York: Longman.

[4] Gladys L. Kandouw and and Anita Dundu. 50 Early Childhood Detection of Autism Spectrum Disorder and Its Interaction with Old People and Siblings. IEEE Transl. E-Clinic, vol. 6, pp. 50–54, June 2018.

[5] Gregorius Hendita A.K, And Lubriady Oktana. Autistic Child-Based Disease Identification System. IEEE Transl. TICom, vol. 1, pp. 29–41, September 2012.

[6] Kanner L. Autistic disturbances of affective contact. *Nervous Child*2, 217-250 (1943).

[7] Melifa Gardenia and Tursina. Autism Detection Expert System In Children Using Fuzzy Tsukamoto Method. Justin. Jurnal Ilmiah Go Infotech, vol. 4, pp. 33–38, March 2016.

[8] Robins, D. L. (2008). *Screening for autism spectrum disorders in primary care settings*. *Autism* 12 (5), 537-556.

[9] Schopler E, Reichler RJ, DeVellis RF, Daly K (1980). Toward objective classification of childhood autism: Childhood Autism Rating Scale (CARS). *J Autism Dev Disord* 10 (1): 91–103.

[10] Sri Muji Rahayu. Early detection and intervention in children with autism. IEEE Transl. Jurnal Pendidikan Anak, vol. 3, pp. 420–428, June 2014.

[11] Helen Sastypratiwi and Anggi S. Sukmanto. Early Autism Diagnosis In Children Using Fuzzy Mamdani Inference Method. IEEE Transl. JEPIN, vol. 3, pp. 40–44, December 2017.

- [12] Arie Qur'ania dan Prita Dhyani S. *Early Detection Of Autism Using Fuzzy Tsukamoto*. IEEE Transl. Prosiding SnaPP: Science and Technology, vol. 1, pp. 329–334, October 2014.
- [13] Yoannita. *Design of Autism Diagnosis System in Children by Using Naïve Bayes*. IEEE Transl. JuTISI, vol. 1, pp. 558–597, 3 December 2017.
- [14] Siti N. Khofiyah and Ardhi Pujianta. *Detection of Autis Disease With Neural Network Of Perceptron Algorithm*. IEEE Transl. JSTIF, vol. 3, pp. 52–58, 1 June 2015.
- [15] Edwar Budiman and Edy Santoso. *Autism Type Detector in Early Childhood Using Linear Method Discriminant Analysis (LDA)*. IEEE Transl. PTIK, vol. 1, pp. 583–592, 07 June 2017.
- [16] Hendita Artha Kusuma and Gregorius. *Autistic Child-Based Disease Identification System*. IEEE Transl. TICOM, vol. 1, pp. 29–41, 1 September 2012.
- [17] Susilo Rini and Amelia P. Wijaya. *Implementation Of Growth Detection Interruption Development Of Under (Age 1-5 Years) With Stimulation, Detection And Early Intervention Growing Grow (Sdidtk) In Posyandu Kelai Kelurahan Penuk Regency Of Banyumas*. IEEE Transl. Jurnal Ilmu Kebidanan, vol. 7, pp. 87-97, June 2016.
- [18] Cahyaning Suryaningrum, Tri M. Ingarianti, and Zainul Anwar. *Model Development Of Early Detection Of Children Needs Special On Level Education Educational Elderly (PAUD) In Malang City*. IEEE Transl. JIPT, vol. 4, pp. 62-74, 1 January 2016.
- [19] Gusti Ayu Kadek T.A., Rosa Delima and Umi Probobekti. *Application of Forward Chaining On Diagnosis Program Children Autism Patients*. IEEE Transl. INFORMATIKA, vol. 5, pp. 46-60, November 2009.
- [20] Alexius Endy Budianto and Novita Karima. *Autism Diagnosis Expert System From Childhood Early with Naïve Bayes Method*. IEEE Transl. Bimasakti, vol. 5, pp. 1-8, October 2017.