HUMAN RESOURCE MANAGEMENT USING ARTIFICIAL INTELLIGENCE

Abstract

Human Resource Management (HRM) plays a pivotal role in optimizing organizational performance by strategically managing an organization's most valuable asset – its human capital. In recent years, the integration of Artificial Intelligence (AI) into HRM processes has emerged as a transformative paradigm, revolutionizing the way organizations attract, develop, and retain talent. This abstract explores the evolving landscape of HRM through the lens of AI, focusing on its potential to enhance decision-making, streamline workflows, and foster a more data-driven and employee-centric approach.. This abstract explores the integration of Artificial Intelligence (AI) through the lens of Genetic Algorithms (GAs) to enhance HRM practices. GAs, inspired by the principles of natural selection and evolution, offer a unique approach to optimizing HRM processes such as recruitment, employee placement, and talent development. the integration of Genetic Algorithms into HRM represents a novel and promising approach to address the complexities of talent management. By leveraging evolutionary principles, GAs contribute to more efficient and data-driven decision-making processes, ultimately enhancing organizational agility and competitiveness in the ever-evolving landscape of human resource management.

Keywords: Human Resource Management (HRM) ,Artificial Intelligence (AI), Genetic Algorithm (GA)

Authors

Manjula Devarakonda Venkata
Pragati Engineering College
Surampalem, Andhra Pradesh, India
dv.manjula,a.harini04

A Harini
Pragati Engineering College
Surampalem, Andhra Pradesh, India
chandrasekhar.koppireddy

Chandra Sekhar Koppireddy
Pragati Engineering College
Surampalem, Andhra Pradesh, India

G. Vijaya Kumar
Pragati Engineering College
Surampalem, Andhra Pradesh, India
vijay9908914010@gmail.com

D. Konda Babu
Pragati Engineering College
Surampalem, Andhra Pradesh, India
dudalakailash@gmail.com

Workers happiness or work contentment depends how happy, pleased workers are in there jobs. Satisfaction at the workplace is typically measured using a survey. Factors that impact workplace retention discussed in such surveys may involve remuneration, load, administration, prospects, accessibility, collaboration, infrastructure (Siregar et al. 2020). These things are essential in organizations that want to maintain their employees happy. Satisfaction doesn't compensate for efficiency or dedication; HR concepts and approaches can demoralize top performers. Understanding the difference between happiness and dedication is crucial for organizations to make rational choices and build a climate of involvement. Satisfaction encompasses key employee interests and needs. It's a decent point of departure, but typically doesn't matter. There are three important dimensions of job satisfaction (Silic et al. 2020).

1. Work satisfaction cannot be seen; it can be assumed only. This is critical when it comes to ones attitude to work.
2. Work satisfaction also determines how well the results fulfill the needs of people and how well expectations are met. If employees working in the company believe like they are working much more than others in the organization but they are not getting the promotion or better compensation, they will become frustrated with the job, the manager, and co-workers. If employee thinks that they are being paid equal wages and being given satisfactory working atmosphere, they will be happy. .
3. Employment satisfaction is one of the desirable outcomes for workers. This is conceptually equal to work satisfaction and job dissatisfaction.

These two words are often confused to be the same, however, they actually have a difference in meaning. Employment satisfaction is closely linked to attitudes. Attitudes depend on attitudes toward hierarchical entities and objects. Job satisfaction applies to job satisfaction. Attitudes refer to reaction but satisfaction refers to success factors. Attitudes are long-lasting, but satisfaction varies with the situation. It is expected to decline much more rapidly than it began. Managers need to note that job satisfaction is essential to a workers' long-term loyalty.

I. FACTOR AFFECTING JOB SATISFACTION

Figure 1: Factor Affecting Job Satisfaction

II. HUMAN RESOURCE MANAGEMENT

HRM is the way to hire and pay staff, establish strategies and develop methods of employee retention. (Noe et al. 2007) In the past many years, HRM has endured several changes and has played an even greater role in organizations today. In past history, HRM included compensation handling, supplying staff with holidays gifts, arranging customer activities and ensuring that documentation was properly done. organizations today require strategic position that is essential to the company's success in hiring. Hunan Resource Management combines person, assets, and leadership to describe the work of professional workers, focusing on managing limited resources effectively to achieve company goals.. The management of human resources is thus meant for the best use of the professional staff available and the successful use of experienced personnel within the company (Rao et al. 2009The building sector faces a significant shortage of qualified workers.. In the coming decade, it is projected to triple from 30 percent today. The total output of the sector would have a negative effect, say industry experts.

Figure 2: Human Resource Management

III. DEFINITION OF HUMAN RESOURCE MANAGEMENT (HRM)

1. **HRM** is the management of people or workers within an enterprise, encompassing various forms. (Obedgiu, V. (2017).)
2. HRM is narrated by **Edwin Flippo** as' composing, arranging, managing of human resources to achieve goals.' "Human resources-personal management has been defined by the National Institute of Personal Management (NIPM) of India as "the part of management that concerns employees at work and their temperament within an enterprise. Its goal is to put together and grow the men and women who make up the business a successful enterprise, considering wellbeing of groups and individuals.
3. **Decenzo and Robbins** state that HRM is concerned with the human aspect of a process. You have to cultivate the talents of and company, promote and sustain their contribution to the enterprise in order to attain institution’s goals. Despite its form, democracy, education, and social action must be maintained.

4. **HRM's Functionality and Scope:** Resource management involves planning, organizing, directing, and controlling. (Longoni et al. 2018)

- It Comprises acquisition, development, employee routine maintenance.
- It supports the achievement of personal, institutional and community objectives.
- It includes studies on management research, philosophy, interaction and economy.
- Team spirit and team effort are involved in this.

IV. ARTIFICIAL INTELLIGENCE

Expert systems is the automated mirroring of natural intelligence processes (Wirtz et al. 2019). The capacity of a computer system or a computer-driven machine to perform smart tasks. It was found that expert systems can now map out highly compound activities, such as playing chess, with great skill following the first computer breakthrough in the 1940s. (Kouziokas, G. N. (2017). Advancements in machine speed and memory power limit access to applications that can achieve human autonomy in large, everyday activities.

1. Artificial Intelligence's Goals

- Expert systems are programs that demonstrate smart behavior, understand, illustrate, clarify, and inform consumers.
- Implement Natural Intelligence in machines by building systems that mimic natural beings.

2. What is Intelligence?

Knowledge can be described as the easiest human action although only the most complex insect activity is rarely taken as an indicator of intellect. Consider the digger wasp behavior, Sphex ichneumons. Once the female wasp returns with food to her burrow, she first positions it on the threshold, searches for intruders inside her burrow, and then then, when the shore is open, takes her food inside. The true essence of the instinctual actions of the wasp is exposed as the food is pushed a few inches away from the entrance to its burrow when it is inside: as it returns, it can replicate the same process as much when the food is transferred. Intelligence — notably missing in Sphex's case — must have the opportunity to respond to new situations. . In general, psychologists do not describe human intellect by a given attribute, but by a mixture of several different skills. AI focused primarily on the following knowledge components listening, reasoning, problem- solving, understanding, and language.

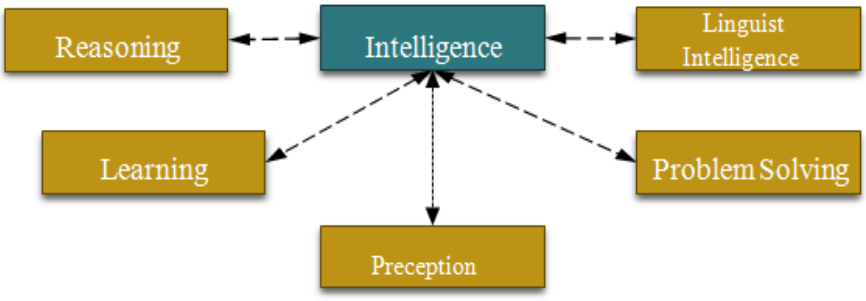

Figure 3: Components of Intelligence

- **Learning:** Artificial intelligence offers various learning methods, including hit and error, rotational learning, and generalization. Hit and error is the easiest approach, while rotational learning involves simple object recall. Generalization involves adapting previous experiences to current similar circumstances. For example, a system that knows the past tense of standard English verbs can generate the past tense of a term like jumping without providing it. Generalization, on the other hand, learns the "add ed" rule and shapes the past tense of jumping based on familiarity with related verbs.

- **Reasoning:** The goal is to draw conclusions from a case using inductive or deductive assumptions. Inductive inference is popular in research, where data is gathered and preliminary models are built to explain and forecast potential behavior. Inductive inference ensures the reality of the inference in deductive situations, while inductive inference confirms the claim by providing full certainty. Inductive inference is essential in situations where anomalous data presence requires updating the model.

- **Problem Solving:** Problem-solving in AI involves a systematic quest to achieve predefined objectives or solutions. Techniques range from specific use to general ones, with modified approaches tailored to specific issues and incorporating specific circumstances.

- **Perception:** Vision involves sensory components, both real and virtual, influencing the image and separating it into objects. Research is complex due to object appearance, lighting, and contrast between the entity and external environment.

- **Language:** Linguistics refers to traditional signals with significance, not limited to words. For example, travel signs represent risk ahead in some countries, forming a language. Table 0.1 Difference between Human and Artificial Intelligence (Yawalkar, M. V. V. (2019), Rani, S).

S. No.	Key Features	Artificial Intelligence	Human Intelligence
1.	Emergence	AI is an improvement in human observations.	Human intelligence is created with the ability to consider, reason and analyze, etc..
2.	Speed of Calculation	Compared to humans, more data can be handled by machines more easily. If a mathematical problem can be solved by the human intelligence within 5 minutes, AI can overcome 10 problems in one minute.	Humans cannot match machine speed.
3.	Decision Making	AI is can make decisions without influence.	Individual decisions can be influenced by specific components which are not dependent on statistics alone.

4.	Energy Consumption	AI uses 2 watts of energy per task.	Human brain uses 25 watts for the same task.
5.	Adaptation of new Environment	AI requires time to adapt to new environments.	Human perspectives adapt to climate changes, enabling individuals to master various abilities.

3. **Functions of Artificial Intelligence in Human Resources:** HR departments are embracing digital revolution through big data analytics, AI, and cloud computing for simplified work. Most of the companies used artificial intelligence or HR bots today. Artificial intelligence can play a major role in human resource management.

- Companies should use digital technologies for recruitments, so that they can have more successful outcome. A chat bot system plays an important role in an organisation's recruiting process.
- By using AI technology, the screening process is simplified because it eliminates human effort. Amy and Clara are software tools used to arrange interviews and work sessions.
- organizations use automation and artificial intelligence, therefore, employers can reduce the administrative burden. AI technology provides problem solving and increases productivity of HR in an enterprise.
- Researchers (Rajesh et al. 2018) explored how AI can successfully streamline employee assessment systems.
- AI is used to make sure there are no favoritism in the business. An company should hire workers based on their credentials and skill.
- AI would bring about greater efficiencies in the business. Various robotic operations have been undertaken in order to boost workplace efficiency. ,these tasks include collection of information, observation , categorizing, sorting, entry of the data into HR and payroll systems etc.
- The use of computers and emerging technologies would be improved. The use of machines and computers in different industries ensures that statistics and feedback can be obtained fast and easily. Microsoft 365 primarily allow workers to save time and reduce the expenses.

4. **Ways AI may help Human Resource**

- Decrease the pressure on company management personnel.
- Identify the best applicants for the job.
- AI helps forecast work retention rates.
- It can transcend human weaknesses and function accordingly.
- The workflow will be maintained in different departments.
- Accurate results can be obtained by AI firms.
- It will improve the participation of workers in the organization.
- It will help decrease bias in judgment.

5. **Challenges of AI in HR Departments:** In the modern enterprise, there is substantial presence of AI in the human resources department. Most of the time, it becomes hard for workers to embrace and to use AI tools and skills in emerging technology. AI would play a big role in the industry because it changes people's minds too much. It will be very necessary for HR department to recruit the right person who can handle AI systems. Another restriction for HR is to make day-to-day decisions as HR would lose its authority and power as HR becomes incapable to take major decisions.

V. GENETIC ALGORITHM (GA)

GA is an optimization approach for addressing constrained and unregulated development issues using a selection mechanism that replicates biological development. The algorithm updates a sequence of results, picking individuals from the population at each step and using the same as parents for next- generation children. GA is a common optimization technique for multi-objective optimization problems under evolution algorithms. It is based on natural selection strategies and uses the concept of Drawin's to achieve structural knowledge transformation using operators. An individual is abstracted as a chromosome, composed of genotype and phenotype, and selected randomly from the population. The best-fitting individuals are chosen for crossover, increasing the number of children by combining genes between parents. If two chromosomes are given, a cut-off point is selected, and the first chromosomes exchange the posterior subset to the cut-off point, producing two new individuals (HANDA, D. (2014)).

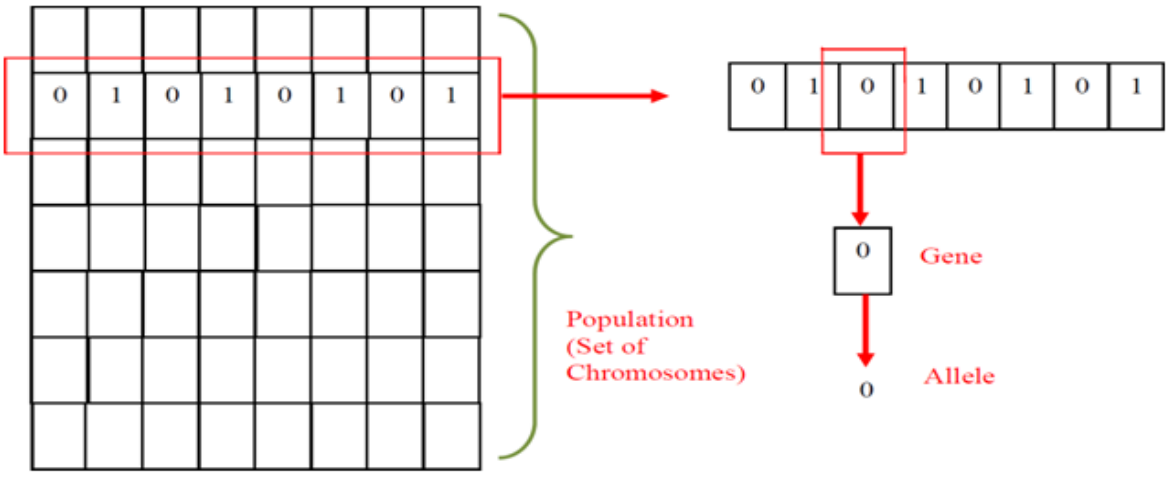

Figure 4: Instance of Population, Chromosome, Gene, and Allele

The terms used in the genetic algorithms are discussed below:

- **Population** refers to the group of probable coded solutions for a problem, similar to human populations. It represents candidate solutions to replace humans.
- **Chromosomes:** It represents a solution to the problem
- **Gene:** Location of element on chromosome.
- **Allele:** It relates to gene value for specific chromosome.
- **Fitness function**: Function calculates bit fitness for processing, enabling further processing.

- **Genetic operators of GA:** Crossover, mutation, and selection.
- **Genotype:** Density in computational area. In this area numerical effects can be easily simulated by using a computer machine.
- **Phenotype:** It represents the true solution in such a way that it appears in the real world.

GA is used to solve optimization problems in a few steps, as shown in Figure 5.

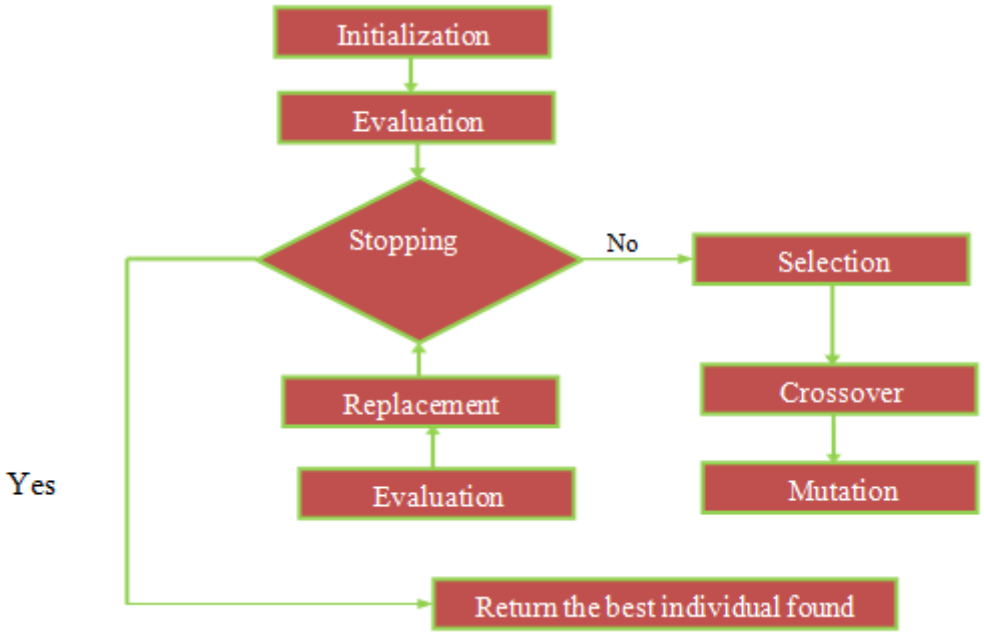

Figure 5: GA Cycle

https://www.gatevidyalay.com/genetic-algorithm-in-ai-operators-working/.

1. **Initialization of Population:** Population is characterized as "all probable coded solution to a problem." It is equivalent to the human population. We have candidate solutions, in addition to replace humans, that reflect humans.

2. **Fitness Function:** The fitness function in GA optimizes the value of a solution, allowing for the selection of the best chromosomes for offspring reproduction. It provides an evaluation criterion for almost all chromosomes, and the obtained value is used to select individuals for further reproduction processes.

   A fitness function may have the following two characteristics:

   - Computation must be quick.
   - This process decides the best value to be allocated to a problem.

Determining Fitness Value Example

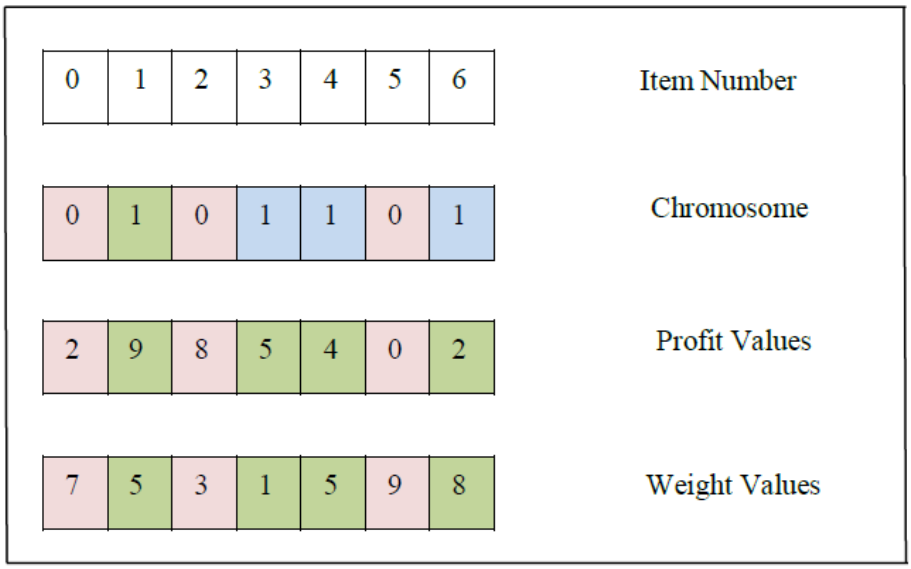

Figure 6: Example of the Fitness Function

3. **Selection:** Genetic algorithm (GA) is a method of selecting two or more crossbreeding parents from a population to generate offspring for the next generation. The goal is to enhance the efficiency of the population's jumps. GA selects chromosomes from the initial population, following Darwin's theory of evolution. The key objective is to shift genotype towards enhanced fitness evaluation within the available search space, ensuring more accurate solutions based on requirements.

VI. REPRODUCTION

Select high-fitness reproduction individuals in the population and generate a new population through cross- breeding and mutation. GA optimizer uses crossover and mutation for offspring reproduction, selecting random points during parent formation. Offspring are combined into the population using single-point, two- point, and uniform crossover methods.

1. **Mutation:** Mutation represents a small arbitrary adaptation on the chromosome, protecting human population diversity. Introduced with less chance, it decreases after random search if the possibility is greater.

2. **Crossover:** Reproduction and biological crossover are close to that of hybridization. More than one parent with more than one offsprings are observed. This argument is applicable to high-probability situations.

   The cross-controllers are discussed next, as well as the example:

- **One point crossover:** Therefore, the mode of crossover depends on the number of chromosomes per offspring

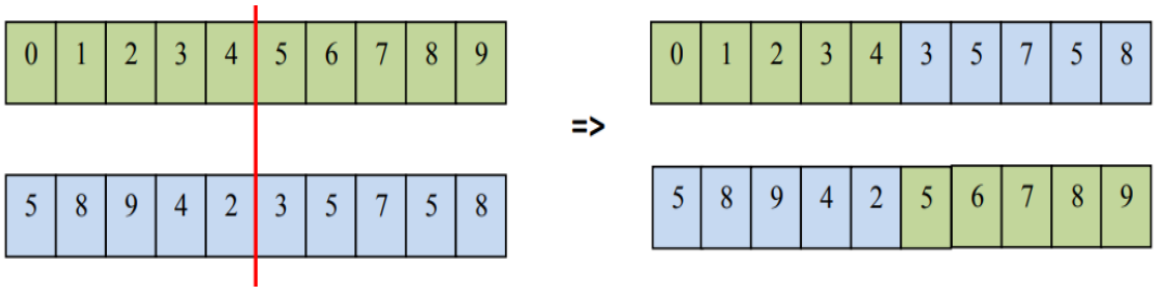

Figure 7: One-Point-CrossOver

- **Multipoint Crossover:** In this process, upwards of one crossover point is used to estimate the offspring value.

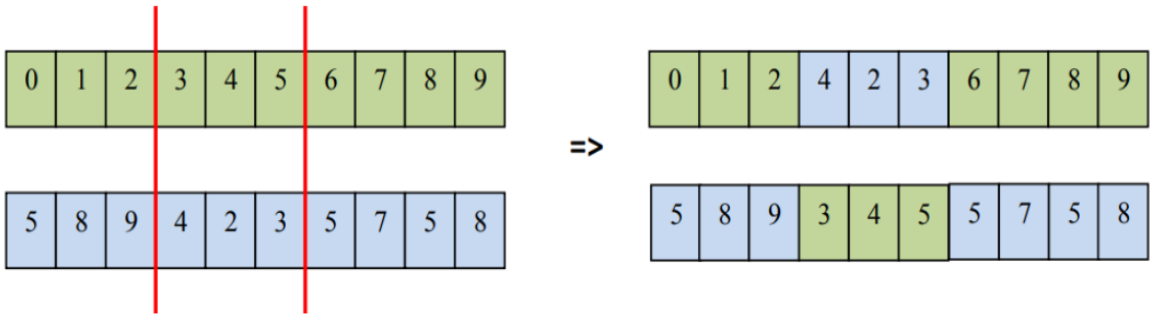

Figure 8: Multipoint Crossover

- **Uniform Crossover:** Chromosomes are not broken into segments and the genes are viewed individually.

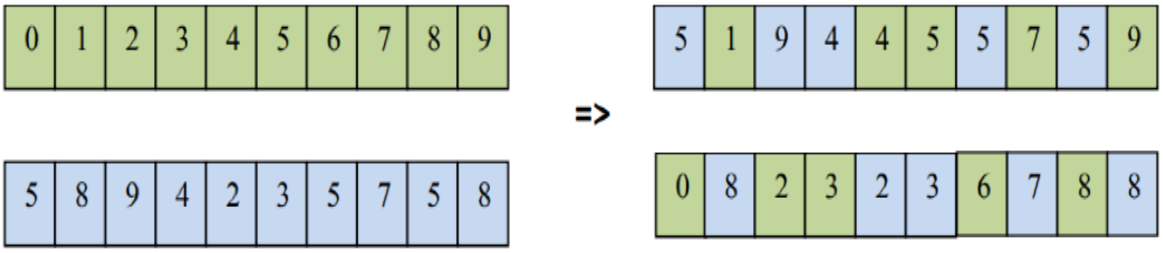

Figure 9: Uniform Crossover

VII. CONCLUSION

Artificial intelligence is revolutionizing the way humans interact with technology, enhancing efficiency and effectiveness in HR tasks. AI-driven solutions not only ease HR professionals' workload but also improve employee experience and add value to the business. This technology is expected to revolutionize the way businesses operate and drive business outcomes.

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