1. What is genetic engineering?
2. How is new DNA acquired in genetic engineering?
3. Why was the term "genetic engineering" first coined?
4. What is the role of Genentech in the history of genetic engineering?
5. How can genetic engineering be applied to fix genetic disorders in humans?
6. What is the significance of genetic engineering in research?
7. How are drugs, vaccines, and other products harvested through genetic engineering?
8. Why are crops genetically engineered in agriculture?
9. What are plants, animals, or microorganisms altered through genetic engineering called?
10. How does genetic engineering contribute to insect and weed management in agriculture?
11. What was the first commercialized genetically modified food?
12. How is genetic engineering applied to transform agriculturally important insect species?
13. What is the role of genetic transformation in reducing agricultural pollution?
14. Why is there concern over intellectual property in genetic engineering?
15. How are ethical issues addressed in genetic engineering?
16. What are the potential applications of genetic engineering in human enhancement?
17. How has technology contributed to improving human lives in terms of biomedical interventions?
18. What recent advances have been made in restoring vision using genetic engineering?
19. How does genetic engineering contribute to the restoration of movement in paralyzed individuals?
20. What is the significance of synthetic blood substitutes in genetic engineering?
21. What is the primary goal of genetic engineering?
22. How is new DNA acquired in genetic engineering?
23. Why was the term "genetic engineering" coined?
24. What is the significance of Genentech in genetic engineering history?
25. How can genetic engineering address severe genetic disorders in humans?
26. Why is genetic engineering important in research?
27. What products can be harvested through genetic engineering?
28. How do genetically engineered crops contribute to agriculture?
29. What are genetically engineered plants, animals, or microorganisms called?
30. Why are crops genetically engineered in agriculture?
31. What was the first commercially available genetically modified food?
32. How are agriculturally important insect species genetically transformed?
33. What is the role of genetic engineering in reducing agricultural pollution?
34. Why is there concern over intellectual property in genetic engineering?
35. How are ethical issues addressed in genetic engineering?
36. What applications does genetic engineering have in human enhancement?
37. How has technology improved human lives through biomedical interventions?
38. What recent advances have been made in restoring vision through genetic engineering?
39. How does genetic engineering contribute to movement restoration in paralyzed individuals?
40. What is the significance of synthetic blood substitutes in genetic engineering?
41. What are the three categories of human enhancement based on genetic interventions?
42. How is genome editing different from pre-existing genetic engineering methods?
43. Why is there ethical debate around genome editing in the human germline?
44. What is the assumption about the force of natural selection in the current human species?
45. How might genetic technologies contribute to human survival and well-being?
46. What is the potential impact of genetic engineering on human evolution, according to some proposals?
47. What are bacteriophages, and when were they discovered independently?
48. How did the discovery of antibiotics impact research on phage therapy?
49. In what ways can phages contribute to infectious disease treatment?
50. How are phages used as vaccine platforms?
51. What are the different categories of genetic enhancements in humans based on application?
52. How was human insulin initially manufactured through genetic engineering?
53. What is gene therapy, and how does it involve genetic engineering of humans?
54. What was the significance of Alipogene tiparvovec in gene therapy?
55. How can genetic engineering contribute to biofuels production using microalgae?
56. What are the economic and environmental focuses in improving lignocellulosic biomass deconstruction for biofuels?
57. What are the major grasses used for biofuel production, and how much did they contribute in 2016?
58. What is the key trait measurable in plants related to drought resilience?
59. How has scientific research contributed to identifying candidate genes for drought resistance in crops?
60. Why is the focus on mechanisms and the entire system crucial in breeding crops for drought resistance?
61. What are the three categories of human enhancement based on genetic interventions?
62. How is genome editing different from pre-existing genetic engineering methods?
63. Why is there ethical debate around genome editing in the human germline?
64. What is the assumption about the force of natural selection in the current human species?
65. How might genetic technologies contribute to human survival and well-being?
66. What is the potential impact of genetic engineering on human evolution, according to some proposals?
67. What are bacteriophages, and when were they discovered independently?
68. How did the discovery of antibiotics impact research on phage therapy?
69. In what ways can phages contribute to infectious disease treatment?
70. How are phages used as vaccine platforms?
71. What are the different categories of genetic enhancements in humans based on application?
72. How was human insulin initially manufactured through genetic engineering?
73. What is gene therapy, and how does it involve genetic engineering of humans?
74. What was the significance of Alipogene tiparvovec in gene therapy?
75. How can genetic engineering contribute to biofuels production using microalgae?
76. What are the economic and environmental focuses in improving lignocellulosic biomass deconstruction for biofuels?
77. What are the major grasses used for biofuel production, and how much did they contribute in 2016?
78. What is the key trait measurable in plants related to drought resilience?
79. How has scientific research contributed to identifying candidate genes for drought resistance in crops?
80. Why is the focus on mechanisms and the entire system crucial in breeding crops for drought resistance?
81. What is the definition of genetic engineering according to recent technological advancements?
82. How does the categorization of human enhancements differ in terms of societal influence?
83. Why is genome editing considered a radical tool, and what are its potential applications in human health?
84. What is the fundamental assumption in discussions about human evolution and natural selection?
85. How are phages applied in infectious disease treatment for both prophylaxis and therapy?
86. What was the revenue from commercial activities in the US biotech sector in 2016?
87. How much did research and development (R&D) expenses increase in the US biotech sector from 2015 to 2016?
88. Why are large biotech companies like Amgen, Biogen, and Celgene significant in the US biotech sector?
89. What is the primary focus of genetic engineering in the field of medicine in the US?
90. How has genetic technology impacted basic medical research related to the human genome?
91. What percentage of the human genome is spanned by exons according to the Human Genome Project?
92. How has the Human Genome Project contributed to medical benefits?
93. What was the aim of the International HapMap Project, and how did it contribute to genetic research?
94. How has next-generation sequencing (NGS) technology impacted whole genome sequencing (WGS)?
95. What is the significance of The Cancer Genome Atlas (TCGA) project in cancer research?
96. How does the Precision Medicine Initiative (PMI) contribute to advancing personalized medicine?
97. What is the focus of the CRISPR/Cas9 technology in treating diseases in the US?
98. How has CRISPR/Cas9 been demonstrated in treating tyrosinemia disease in the US?
99. Why is improving the specificity of CRISPR/Cas9 important, and how is it addressed?
100. What is the role of Streptococcus pyogenes Cas9-HF1 variant in improving specificity?
101. How has the NIH in the US approved the application of CRISPR/Cas9 to human cell trials?
102. What was the focus of the first human-based trial using CRISPR/Cas9 technology in China?
103. How is CRISPR/Cas9 expected to impact cancer treatment more effectively in the US?
104. What is the significance of the first CRISPR clinical trial in ensuring its safety for human use?
105. How is genetic technology applied in medical diagnosis in the US?
106. Why is molecular diagnostics considered the fastest-growing market in the US?
107. What are the expected areas of focus for molecular diagnostics in the US?
108. How has the US agricultural sector progressed with genetic engineering applications?
109. What is the purpose of studies using genetic technology in animals and fisheries in the US?
110. How does genetic engineering contribute to the development of biofuels in the US?
111. What is the current focus in improving lignocellulosic biomass deconstruction for biofuels in the US?
112. How are maize and sugarcane significant in the US biofuel-producing feedstocks?
113. How does genetic engineering contribute to improving plant performance under drought conditions?
114. What is the measurable trait related to drought resilience in plants?
115. What was the percentage increase in revenue from commercial activities in the US biotech sector from 2015 to 2016?
116. How did large biotech companies like Amgen and Celgene contribute to the US biotech sector's global dominance?
117. Why is the therapeutic field the primary focus of genetic engineering in the field of medicine in the US?
118. What technique was primarily used in the Human Genome Project, and what did it reveal about the human genome?
119. How has the Human Genome Project contributed to medical benefits, and can you provide examples?
120. What was the aim of the International HapMap Project, and how did it accelerate genetic research?
121. How has next-generation sequencing (NGS) technology transformed whole genome sequencing (WGS)?
122. What role did The Cancer Genome Atlas (TCGA) project play in advancing cancer research in the US?
123. How does the Precision Medicine Initiative (PMI) contribute to advancing individualized care in the US?
124. What is the goal of CRISPR/Cas9 technology in treating diseases in the US, and how does it achieve this goal?
125. How has CRISPR/Cas9 been applied in treating tyrosinemia disease in the US, and what were the outcomes?
126. Why is improving the specificity of CRISPR/Cas9 crucial, and what methods are used to address this challenge?
127. What is the significance of the Streptococcus pyogenes Cas9-HF1 variant in enhancing specificity in genetic editing?
128. How did the NIH approval in June 2016 mark a milestone for CRISPR/Cas9 technology in the US?
129. What was the focus of the first human-based trial using CRISPR/Cas9 technology in China, and what genes were targeted?
130. How does combining CRISPR/Cas9 with other technologies enhance cancer treatment effectiveness in the US?
131. Why is ensuring the safety of CRISPR/Cas9 crucial for its application in human trials, and what were the safety considerations in the first trial?
132. What is the expected market growth for molecular diagnostics in the US by 2023, and why is it considered the fastest-growing market?
133. How has the US agricultural sector progressed in genetic engineering applications, and which crops have seen significant growth?
134. What is the primary purpose of studies using genetic technology in animals and fisheries in the US?
135. How does genetic engineering contribute to the development of biofuels in the US, and what is the focus of current efforts?
136. What are the major biofuel-producing grasses, and how much did they contribute to bioethanol production in 2016?
137. How does genetic engineering contribute to improving plant performance under drought conditions, and what is the key measurable trait?
138. What is the focus of The Cancer Genome Atlas (TCGA) project, and how many cancer types did it characterize?
139. Why is the NIH approval in June 2016 significant for CRISPR/Cas9 technology in the US?
140. What are the major factors driving the molecular diagnostics market in the US?
141. How do molecular diagnostic tests precisely identify disease-associated DNA or RNA sequences?
142. Why are PCR and its advanced variants expected to command the largest share in molecular diagnostics technology?
143. What clinical trial applications are currently the focus of molecular diagnostic tests in the US?
144. How effective are LAMP and NASBA assays in detecting viral infectious diseases like influenza A and H5N1?
145. Why are issues related to HIV-1 infection and assessment of HIV/AIDS progression addressed in the US?
146. What methods are utilized for quantifying HIV-1 RNA in the US, and what commercial assays are available for genotyping?
147. How do molecular diagnostic tests contribute to screening and measuring the drug response of patients with hepatitis B or C?
148. Why has high-sensitivity PCR replaced conventional methods in detecting Chlamydia trachomatis and Neisseria gonorrhoeae?
149. How has gene therapy become a representative application of genetic technology in treating diseases in the US?
150. What approach is used in in vivo gene therapy, and how is gene transfer accomplished?
151. How does ex vivo gene therapy differ from in vivo gene therapy, and what is the process involved?
152. Why has the US been a leader in gene therapy research, and what percentage of clinical trials does it account for globally?
153. How does the US gene therapy industry contribute to the North American cancer therapeutics market?
154. What role do modern genetic techniques play in vaccine technology, and how are they applied in the US?
155. How is reverse vaccinology applied to pathogens with high antigenic variation, such as HIV and influenza?
156. Why are chimeric antigen receptors (CARs) considered beneficial in cancer vaccines, and how do they function?
157. How have DNA vaccines been applied to enhance humoral and cell-mediated immune responses against pathogens?
158. What is the role of the US in commercializing genetically modified (GM) crops, and when did this trend begin?
159. How has the adoption rate of Bt corn variants contributed to pest resistance management in the US?
160. Why is seed selection a crucial research direction in agricultural biotechnology, particularly in the US?
161. How does the genetic event and promoter used in developing Bt hybrids affect the level of protection they provide?
162. What technologies are included in the new breeding technologies section, added in 2016, to advance plant biotechnology?
163. How does SmartStax hybrid (Monsanto and Dow AgroSciences) provide stacked protection against pests in the US?
164. Why have DNA vaccines been extensively studied for cancer immunotherapy in the US, and what benefits do they offer?
165. What is the significance of early-stage cancer detection in molecular diagnostics, and how do these tests contribute to it?
166. How do advanced molecular diagnostic methods like NGS, microarray, and FISH contribute to disease detection, and in what scenarios are they applicable?
167. What is the role of viral RNA quantitative assays in monitoring HIV-1-infected patients, and how do they contribute to treatment decisions?
168. Why is it important to quantify hepatitis B virus (HBV) DNA, and what are the typical commercial kits available for this purpose?
169. How does the application of multiplex-PCR enhance the identification of bacterial pathogens causing meningitis, and what pathogens are commonly targeted?
170. What challenges and solutions are associated with infectious diseases caused by antibiotic-resistant strains, and how do rapid detection methods contribute to addressing the issue?
171. How does the COBAS AmpliPrep/COBAS TaqMan HIV-1 test contribute to monitoring HIV-1 viral load, and what is its detection range?
172. What are the different gene therapy applications beyond cancer treatment, and how do they address genetic disorders and infectious diseases?
173. How do researchers overcome challenges in gene therapy targeting cancer by directly transferring genes into target cells, and what outcomes are expected?
174. Why are modern genetic techniques, such as CRISPR/Cas9 and synthetic genomics, considered groundbreaking in plant biotechnology, and how do they overcome limitations?
175. How has the US contributed to the development of genetically modified crops, and what factors have fueled the rapid growth of GM planted areas?
176. What is the significance of seed selection in agricultural biotechnology, and how do changes in intellectual property rights impact research directions?
177. How does the CRISPR/Cas9 technology contribute to advancements in plant biotechnology, and what benefits does it offer in genetic modification?
178. What is the role of SmartStax hybrid in pest resistance, and how does it utilize multiple events to provide broad protection in agriculture?
179. How do reverse vaccinology and monoclonal antibody techniques contribute to the design of vaccines, and what success has been achieved in preventing diseases like respiratory syncytial virus (RSV)?
180. What is Roundup Ready Corn, and when was it first commercialized in the US?
181. How does Liberty Link Corn differ from Roundup Ready Corn, and what herbicide is it resistant to?
182. What approach did Pioneer HiBred use in developing maize resistant to imidazolinone herbicides, and what did the results demonstrate?
183. Why is oligonucleotide-mediated gene manipulation advantageous in crop improvement, and how does it overcome concerns associated with transgenic events?
184. What stacked herbicide tolerance traits were approved in MON 87419 and MZIR098 in 2016, and how do they provide benefits to growers?
185. Why did the evolution of glyphosate-resistant weeds prompt the development of crops with resistance to multiple herbicides, and what benefits does it offer?
186. How did the USDA-approved drought-tolerant trait in maize (MON87460) address the challenges posed by worsening drought conditions in the US?
187. What is the significance of DroughtGard maize hybrids, and how much did they increase in planted hectares from 2015 to 2016?
188. How many GM maize events received approval by US regulators as of November 2016, and for what traits were they approved?
189. What is the predominant source of soybeans grown in the US, and what herbicide-tolerant trait did Roundup Ready® soybeans express?
190. What was unique about the soybean RReady2YieldTM, and how many GM soybean events were approved for food, feed, and cultivation by 2016?
191. How did scientists achieve herbicide resistance in soybeans, specifically with Roundup Ready® soybeans, and what genetic elements were involved?
192. What challenges did the rapid evolution of glyphosate-resistant weeds pose, and how are new crop varieties addressing this issue?
193. What are the observed benefits of targeted downregulation of FAD2-1A and -1B genes in soybean oils, and how was this achieved?
194. How did low phytic acid mutations in soybean seeds contribute to improved human absorption of iron and zinc, and what additional benefits were achieved?
195. What other crops, beyond corn and soybeans, have been approved for commercialization, and what traits have been introduced in these crops?
196. Why do GM crops face concerns about risks to human health, and what steps has the US government taken to address these concerns?
197. What are the recent developments in the regulatory approval of new biotech apples and potatoes, and what traits are hoped to expedite their regulatory process?
198. How did CRISPR/Cas9 technology contribute to creating a mushroom resistant to browning, and what makes this mushroom the first CRISPR-edited organism approved by the US government?
199. What new varieties of crops, such as corn, tomatoes, and cotton, have been developed using CRISPR/Cas9 technology, and what benefits do they offer?
200. How does gene editing technology like CRISPR/Cas9 enable cisgenic breeding, and why does it face lower regulatory hurdles compared to transgenics?
201. How did scientists use CRISPR/Cas9 technology to confer PRRSV-resistance in pigs, and what economic impact does this have on agriculture?
202. What is Roundup Ready Corn, and when was it first introduced in the market?
203. How does Liberty Link Corn differ from Roundup Ready Corn, and which herbicide is it resistant to?
204. How did Pioneer HiBred achieve imidazolinone herbicide resistance in maize, and what did the results demonstrate?
205. Why is oligonucleotide-mediated gene manipulation considered advantageous in crop improvement, and what concerns does it overcome?
206. What stacked herbicide tolerance traits were approved in MON 87419 and MZIR098 in 2016, and how do they benefit growers?
207. Why did the rapid evolution of glyphosate-resistant weeds drive the development of crops with resistance to multiple herbicides?
208. How did the USDA-approved drought-tolerant trait in maize (MON87460) address worsening drought conditions in the US?
209. What benefits are associated with DroughtGard maize hybrids, and how much did they increase in planted hectares from 2015 to 2016?
210. How many GM maize events received approval from US regulators as of November 2016, and for what traits were they approved?
211. What is the primary source of soybeans in the US, and which herbicide-tolerant trait did Roundup Ready® soybeans express?
212. What made the soybean RReady2YieldTM unique, and how many GM soybean events were approved for various uses by 2016?
213. How did scientists achieve herbicide resistance in soybeans, specifically with Roundup Ready® soybeans, and what genetic elements were involved?
214. What challenges arose due to the rapid evolution of glyphosate-resistant weeds, and how are new crop varieties addressing these challenges?
215. What are the observed benefits of targeted downregulation of FAD2-1A and -1B genes in soybean oils, and how was this achieved?
216. How did low phytic acid mutations in soybean seeds contribute to improved nutrient absorption and reduced phosphorus pollution?
217. Which crops, beyond corn and soybeans, received approval for commercialization, and what traits were introduced in these crops?
218. What is a Genetic Algorithm (GA) and how is it inspired by natural selection?
219. How does GA create new populations, and what are the key elements involved in its operation?
220. Why is the procedure of GA initiated with the random initialization of a population of chromosomes?
221. What role do selection, crossover, and mutation operations play in GA, and how are they repeated until a new population is complete?
222. How does GA dynamically change the search process, and why are probabilities of crossover and mutation crucial?
223. Why is the value of the crossover rate (Cp) significant in GA, and how does it impact the production of offspring from parent chromosomes?
224. What is the mathematical analysis of GA, and how does it dynamically change the parameter R over generations?
225. Why is it essential for GA to maintain low similarity between individuals in the early stages, and how does it contribute to preserving genetic schema?
226. How does the Schema theorem support the evolution of genetic schemas in GA, and what role does it play in maintaining diversity?
227. What does Algorithm 1 pseudocode of classical genetic algorithm illustrate, and how does it outline the main steps of GA?
228. What are the genetic operators used in GAs, and how do encoding schemes, crossover, mutation, and selection contribute to the search process?
229. Why are encoding schemes crucial in GAs, and what are some examples of encoding schemes used for problem domains?
230. How does binary encoding represent genes in GAs, and what challenges are associated with its use in some engineering design problems?
231. What is the purpose of roulette wheel selection in GAs, and how does it determine which individuals participate in the reproduction process?
232. Why is rank selection a modification of roulette wheel selection, and how does it address the premature convergence problem?
233. How does tournament selection work in GAs, and what advantages does it offer in terms of selecting individuals for the next generation?
234. What is stochastic universal sampling (SUS) in GAs, and how does it improve the even distribution of selection probabilities?
235. Why is Boltzmann selection based on entropy and sampling methods, and how does it address premature convergence issues?
236. What is elitism selection in GAs, and why is it introduced to ensure the propagation of the best individuals to the next generation?
237. How does order crossover (OX) operate in GAs, and for which type of problems is it particularly useful?
238. What is the significance of partial matched crossover in GAs, and how does it contribute to better exploration in certain applications?
239. Why was shuffle crossover introduced in GAs, and how does it address bias introduced by other crossover techniques?
240. How does reduced surrogate crossover (RCX) operate in GAs, and what is its assumption regarding the diversity of parent chromosomes?
241. What are the five main categories of GA variants, and how are they classified based on representations and objectives?
242. What is a Genetic Algorithm (GA) and how is it inspired by natural selection?
243. How does GA create new populations, and what are the key elements involved in its operation?
244. Why is the procedure of GA initiated with the random initialization of a population of chromosomes?
245. What role do selection, crossover, and mutation operations play in GA, and how are they repeated until a new population is complete?
246. How does GA dynamically change the search process, and why are probabilities of crossover and mutation crucial?
247. Why is the value of the crossover rate (Cp) significant in GA, and how does it impact the production of offspring from parent chromosomes?
248. What is the mathematical analysis of GA, and how does it dynamically change the parameter R over generations?
249. Why is it essential for GA to maintain low similarity between individuals in the early stages, and how does it contribute to preserving genetic schema?
250. How does the Schema theorem support the evolution of genetic schemas in GA, and what role does it play in maintaining diversity?
251. What does Algorithm 1 pseudocode of classical genetic algorithm illustrate, and how does it outline the main steps of GA?
252. What are the genetic operators used in GAs, and how do encoding schemes, crossover, mutation, and selection contribute to the search process?
253. Why are encoding schemes crucial in GAs, and what are some examples of encoding schemes used for problem domains?
254. How does binary encoding represent genes in GAs, and what challenges are associated with its use in some engineering design problems?
255. What is the purpose of roulette wheel selection in GAs, and how does it determine which individuals participate in the reproduction process?
256. Why is rank selection a modification of roulette wheel selection, and how does it address the premature convergence problem?
257. How does tournament selection work in GAs, and what advantages does it offer in terms of selecting individuals for the next generation?
258. What is stochastic universal sampling (SUS) in GAs, and how does it improve the even distribution of selection probabilities?
259. Why is Boltzmann selection based on entropy and sampling methods, and how does it address premature convergence issues?
260. What is elitism selection in GAs, and why is it introduced to ensure the propagation of the best individuals to the next generation?
261. How does order crossover (OX) operate in GAs, and for which type of problems is it particularly useful?
262. What is the significance of partial matched crossover in GAs, and how does it contribute to better exploration in certain applications?
263. Why was shuffle crossover introduced in GAs, and how does it address bias introduced by other crossover techniques?
264. How does reduced surrogate crossover (RCX) operate in GAs, and what is its assumption regarding the diversity of parent chromosomes?
265. What are the five main categories of GA variants, and how are they classified based on representations and objectives?
266. How do real-coded GAs differ from binary-coded GAs, and what are the advantages and challenges associated with each representation?
267. Why are crossover operators crucial in real-coded GAs, and how have researchers modified them to enhance performance in continuous search spaces?
268. How does simulated binary crossover (SBX) address issues like Hamming cliffs and precision problems in real-coded GAs?
269. What is the purpose of multiobjective genetic algorithms (MOGAs), and how do they differ from simple GAs in terms of fitness function assignment?
270. How are convergence, diversity, and coverage addressed in multiobjective GAs, and why are these goals essential?
271. What are the two main categories of multiobjective GAs, and how are Pareto-based and decomposition-based approaches distinguished?
272. How does the Pareto dominance concept contribute to multiobjective GAs, and who introduced the concept?
273. Why is non-dominated sorting genetic algorithm (NSGA) introduced, and what challenges does it face in terms of elitism and computation complexity?
274. What is the significance of fast elitist non-dominated sorting genetic algorithm (NSGA-II), and how does it overcome diversity maintenance challenges in Pareto fronts?
275. How does dynamic crowding distance improve NSGA-II's ability to maintain diversity in Pareto fronts, and who proposed this enhancement?
276. Why is niched Pareto genetic algorithm (NPGA) introduced, and how does it utilize tournament selection and Pareto dominance concepts?
277. What challenges do Pareto-based approaches face in many-objective problems, and why may their performance deteriorate in such scenarios?
278. How do decomposition-based multiobjective genetic algorithms work, and what is their approach to solving problems simultaneously?
279. What does multiobjective genetic local search (MOGLS) achieve, and how does it use random weights for parent selection and local search?
280. How does cellular genetic algorithm for multiobjective optimization (C-MOGA) extend the concepts of MOGA, and what role does cellular structure play?
281. What is the purpose of immigration in cellular genetic algorithm for multiobjective optimization (CI-MOGA), and who introduced this extension?
282. Why is Tchebycheffs-based genetic algorithm introduced in multiobjective optimization, and how does it use the Tchebycheff scalar function for non-dominated solution generation?
283. How does opposition-based learning contribute to decomposition-based MOGAs, and what specific enhancement did Patel et al. propose in D-MOGA?
284. What is the motivation behind parallel genetic algorithms, and how do they aim to improve computational time and solution quality?
285. What are the three broad categories of parallel genetic algorithms, and how do master-slave parallel GAs distribute the computation of fitness functions?
286. Why is fine-grained parallel genetic algorithm used, and how do genetic operators interact with each other in this approach?
287. What characterizes multi-population coarse-grained parallel genetic algorithms, and why is the exchange of individuals among subpopulations essential?
288. How do master-slave parallel GAs maximize computation power, and what challenges do they face in terms of computational time?
289. What real-life problems did Hong et al. solve using master-slave parallel genetic algorithms, and how did they implement fuzzy rules in their approach?
290. For which problem, and how, did Sahingzo implement master-slave parallel genetic algorithms, and what was the role of processors in this case?
291. What is the purpose of opposition-based learning in decomposition-based MOGAs, and how does D-MOGA integrate it for weight vector generation?
292. How do parallel genetic algorithms address the challenges of maximizing memory bandwidth and utilizing GPU power?
293. What is the role of control parameters in the migration process of multi-population coarse-grained parallel genetic algorithms?