Home > Machine Learning > 40 Questions to ask a Data Scientist on Ensemble Modeling Technique...

40 Questions to ask a Data Scientist on Ensemble Modeling Techniques (Skilltest Solution)

Ankit Gupta
Last Updated : 24 Jun, 2022

15 min read

Introduction

Ensemble modeling is a powerful way to improve the performance of your machine learning models. If you wish to be on the top of leaderboard in any machine learning competition or want to improve models you are working on – ensemble is the way to go. The meme below kind of summarizes the power of ensembling:

Given the importance of ensemble modeling, we decided to test our community on ensemble modeling. The test included basics of ensemble modeling and its practical applications.
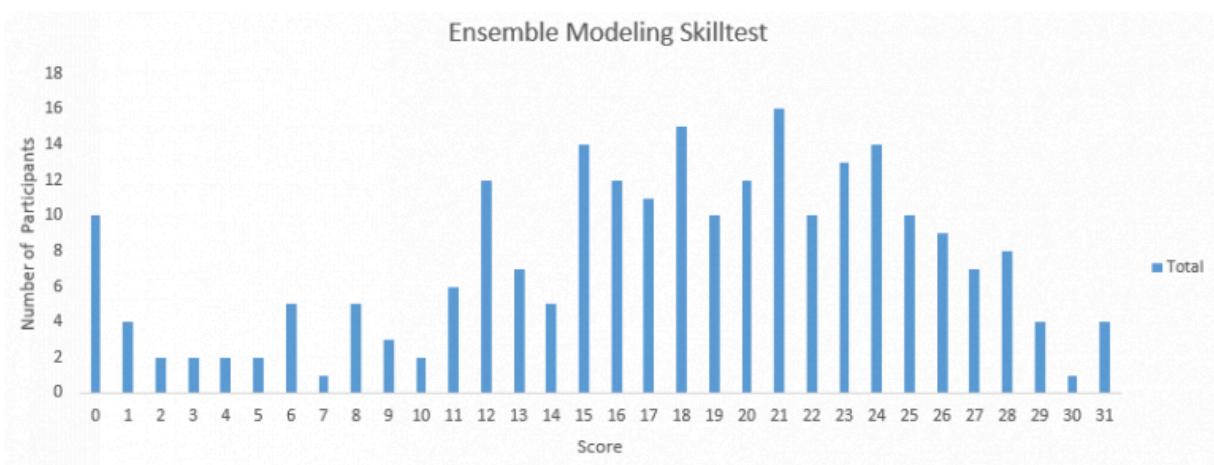
A total of 1411 participants registered for the skill test. If you missed taking the test, here is your opportunity for you to find out how many questions you could have answered correctly.

Read on!
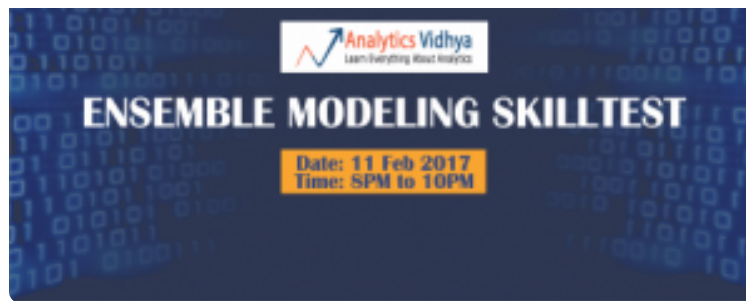
Overall Results

Below is the distribution of scores, this will help you evaluate your performance:

You can access your performance here. More than 230 people participated in the skill test and the highest score was 31. Here are a few statistics about the distribution.

Overall distribution

Mean Score: 17.54

Median Score: 18

Mode Score: 21

Helpful Resources

5 Easy questions on Ensemble Modeling everyone should know

Powerful 'Trick' to choose right models in Ensemble Learning

If you are new to ensemble learning, we have you covered – you can enrol in this free course where we cover all the main ensemble modelling techniques in a structured and comprehensive manner: [Ensemble Learning and Ensemble Learning Techniques](#)

Questions & Answers

Q1. Which of the following algorithm is not an example of an ensemble method?

    A. Extra Tree Regressor

    B. Random Forest

    C. Gradient Boosting

    D. Decision Tree

Solution: (D)

Option D is correct. In case of decision tree, we build a single tree and no ensembling is required.

Q2. What is true about an ensembled classifier?

    1. Classifiers that are more "sure" can vote with more conviction

    2. Classifiers can be more "sure" about a particular part of the space

    3. Most of the times, it performs better than a single classifier

    A. 1 and 2

    B. 1 and 3

    C. 2 and 3

    D. All of the above

Solution: (D)

In an ensemble model, we give higher weights to classifiers which have higher accuracies. In other words, these classifiers are voting with higher conviction.

On the other hand, weak learners are sure about specific areas of the problem. By ensembling these weak learners, we can aggregate the results of their sure parts of each of them.

The final result would have better results than the individual weak models.

Q3. Which of the following option is / are correct regarding benefits of ensemble model?

1. Better performance

2. Generalized models

3. Better interpretability

A. 1 and 3

B. 2 and 3

C. 1 and 2

D. 1, 2 and 3

Solution: (C)

1 and 2 are the benefits of [ensemble modeling](). Option 3 is incorrect because when we ensemble multiple models, we lose interpretability of the models.

Q4) Which of the following can be true for selecting base learners for an ensemble?

1. Different learners can come from same algorithm with different hyper parameters

2. Different learners can come from different algorithms

3. Different learners can come from different training spaces

A. 1

B. 2

C. 1 and 3

D. 1, 2 and 3

Solution: (D)

We can create an ensemble by following any / all of the options mentioned above. So option D is correct.

Q5. True or False: Ensemble learning can only be applied to supervised learning methods.

A. True

B. False

Solution: (B)

Q

6. True or False: Ensembles will yield bad results when there is significant diversity among the models.

Note: All individual models have meaningful and good predictions.

A. True

B. False

Solution: (B)

An ensemble is an art of combining a diverse set of learners (individual models) together to improvise on the stability and predictive power of the model. So, creating an ensemble of diverse models is a very important factor to achieve better results.

Q7. Which of the following is / are true about weak learners used in ensemble model?

    1. They have low variance and they don't usually overfit

    2. They have high bias, so they can not solve hard learning problems

    3. They have high variance and they don't usually overfit

    A. 1 and 2

    B. 1 and 3

    C. 2 and 3

    D. None of these

Solution: (A)

Weak learners are sure about particular part of a problem. So they usually don't overfit which means that weak learners have low variance and high bias.

Q8.True or False: Ensemble of classifiers may or may not be more accurate than any of its individual model.

    A. True

Solution: (A)

Usually, ensemble would improve the model, but it is not necessary. Hence, option A is correct.

Q9. If you use an ensemble of different base models, is it necessary to tune the hyper parameters of all base models to improve the ensemble performance?

    A. Yes

    B. No

    C. can't say

Solution: (B)

It is not necessary. Ensemble of weak learners can also yield a good model.

Q10. Generally, an ensemble method works better, if the individual base models have _____?

Note: Suppose each individual base models have accuracy greater than 50%.

    A. Less correlation among predictions

    B. High correlation among predictions

    C. Correlation does not have any impact on ensemble output

    D. None of the above

Solution: (A)

A lower correlation among ensemble model members will increase the error-correcting capability of the model. So it is preferred to use models with low correlations when creating ensembles.

Context – Question 11

In an election, N candidates are competing against each other and people are voting for either of the candidates. Voters don't communicate with each other while casting their votes.

Q.11 Which of the following ensemble method works similar to above-discussed election procedure?

A. Bagging

B. Boosting

C. A Or B

D. None of these

Solution: (A)

In bagged ensemble, the predictions of the individual models won't depend on each other. So option A is correct.

Q12. Suppose you are given 'n' predictions on test data by 'n' different models (M1, M2, …. Mn) respectively. Which of the following method(s) can be used to combine the predictions of these models?

Note: We are working on a regression problem

1. **Median**
2. **Product**
3. **Average**
4. **Weighted sum**
5. **Minimum and Maximum**
6. **Generalized mean rule**

A. 1, 3 and 4

B. 1,3 and 6

C. 1,3, 4 and 6

D. All of above

Solution: (D)

All of the above options are valid methods for aggregating results of different models (in case of a regression model).

Context: Question 13 -14

Suppose, you are working on a binary classification problem. And there are 3 models each with 70% accuracy.

Q13. If you want to ensemble these models using majority voting method. What will be the maximum accuracy you can get?

C. 44%

D. 70

Solution: (A)

Refer below table for models M1, M2 and M3.

Actual output	M1	M2	M3	Output
1	1	0	1	1
1	1	0	1	1
1	1	0	1	1
1	0	1	1	1
1	0	1	1	1
1	0	1	1	1
1	1	1	1	1
1	1	1	0	1
1	1	1	0	1
1	1	1	0	1

Q14. If you want to ensemble these models using majority voting. What will be the minimum accuracy you can get?

D. None of these

Solution: (C)

Refer below table for models M1, M2 and M3.

Actual Output	M1	M2	M3	Output
1	1	0	0	0
1	1	1	1	1
1	1	0	0	0
1	0	1	0	0
1	0	1	1	1
1	0	0	1	0
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

Q15. How can we assign the weights to output of different models in an ensemble?

3. Give high weights to more accurate models

A. 1 and 2

B. 1 and 3

C. 2 and 3

D. All of above

Solution: (D)

All of the options are correct to decide weights of individual models in an ensemble.

Q16. Which of the following is true about averaging ensemble?

A. It can only be used in classification problem

B. It can only be used in regression problem

C. It can be used in both classification as well as regression

D. None of these

Solution: (C)

You can use average [ensemble](#) on classification as well as regression. In classification, you can apply averaging on prediction probabilities whereas in regression you can directly average the prediction of different models.

Context Question 17

Suppose you have given predictions on 5 test observations.

$$predictions = [0.2, 0.5, 0.33, 0.8]$$

Which of the following will be the ranked average output for these predictions?

Hint: You are using min-max scaling

A. [0., 0.66666667, 0.33333333, 1.]

B. [0.1210, 0.66666667, 0.95, 0.33333333]
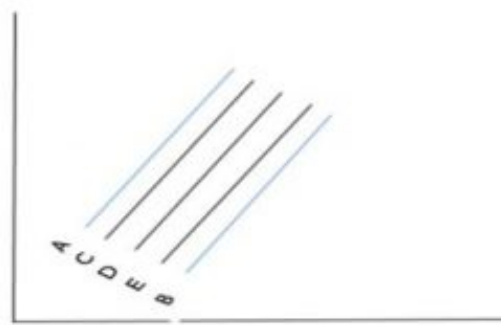
D. None of above

Solution: (A)

The following steps can be applied to get the output in options A

1. Given ranking to the predictions

2. Scale these ranking using min max scaling

You can follow this code in python to get the desired result.

```
from sklearn.preprocessing import MinMaxScaler
x = np.array([0.2,0.5,0.33, 0.8])
sc = MinMaxScaler()
sc.fit_transform(np.argsort(x))
```

Q18.

In above snapshot, line A and B are the predictions for 2 models (M1, M2 respectively). Now, You want to apply an ensemble which aggregates the results of these two models using weighted averaging. Which of the following line will be more likely of the output of this ensemble if you give 0.7, 0.3 weights to models M1 and M2 respectively.

A) A
B) B
C) C
D) D
E) E

Solution: (C)

1. we want to give higher weights to better performing models
2. Inferior models can overrule the best model if collective weighted votes for inferior models is higher than best model
3. Voting is special case of weighted voting

    A. 1 and 3

    B. 2 and 3

    C. 1 and 2

    D. 1, 2 and 3

    E. None of above

Solution: (D)

All of the statements are true.

Context – Question 20-21

Suppose in a classification problem, you have following probabilities for three models: M1, M2, M3 for five observations of test data set.

M1	M2	M3	Output
.70	.80	.75	
.50	.64	.80	
.30	.20	.35	
.49	.51	.50	
.60	.80	.60	

Q20. Which of the following will be the predicted category for these observations if you apply probability threshold greater than or equals to 0.5 for category "1" or less than 0.5 for category "0"?

Note: You are applying the averaging method to ensemble given predictions by three models.

M1	M2	M3	Output
.70	.80	.75	1
.50	.64	.80	1
.30	.20	.35	0
.49	.51	.50	0
.60	.80	.60	1

B.

M1	M2	M3	Output
.70	.80	.75	1
.50	.64	.80	1
.30	.20	.35	0
.49	.51	.50	1
.60	.80	.60	1

C.

M1	M2	M3	Output
.70	.80	.75	1

.30	.20	.35	1
.49	.51	.50	0
.60	.80	.60	0

D. None of these

Solution: (B)

Take the average of predictions of each models for each observation then apply threshold 0.5 you will get B answer.

For example, in first observation of the models (M1, M2 and M3) the outputs are 0.70,0.80,0.75 if you take the average of these three you will get 0.75 which is above 0.5 that means this observation will belong to class 1.

Q21: Which of the following will be the predicted category for these observations if you apply probability threshold greater than or equals to 0.5 for category "1" or less than 0.5 for category "0"?

A.

M1	M2	M3	Output
.70	.80	.75	1
.50	.64	.80	1
.30	.20	.35	0
.49	.51	.50	0
.60	.80	.60	1

M1	M2	M3	Output
.70	.80	.75	1
.50	.64	.80	1
.30	.20	.35	0
.49	.51	.50	1
.60	.80	.60	1

C.

M1	M2	M3	Output
.70	.80	.75	1
.50	.64	.80	1
.30	.20	.35	1
.49	.51	.50	0
.60	.80	.60	0

D. None of these

Solution: (B)

Take the weighted average of the predictions of each model for each observation then apply threshold 0.5 you will get B answer.

Context: Question 22-23

Suppose in binary classification problem, you have given the following predictions of three models (M1, M2, M3) for five observations of test data set.

M1	M2	M3	Output
1	1	0	
0	1	0	
0	1	1	
1	0	1	
1	1	1	

Q22: Which of the following will be the output ensemble model if we are using majority voting method?

A.

M1	M2	M3	Output
1	1	0	0
0	1	0	1
0	1	1	0
1	0	1	0

B.

M1	M2	M3	Output
1	1	0	1
0	1	0	0
0	1	1	1
1	0	1	1
1	1	1	1

C.

M1	M2	M3	Output
1	1	0	1
0	1	0	0
0	1	1	1
1	0	1	0
1	1	1	1

D. None of these

Solution: (B)

For example for a first observation of models(M1,M2 and M3) the outputs are 1,1,0 if you take the majority voting of these three models predictions you will get 2 votes for class 1 that means this observation will belong to class 1.

Q23. When using the weighted voting method, which of the following will be the output of an ensemble model?

Hint: Count the vote of M1, M2, and M3 as 2.5 times, 6.5 times and 3.5 times respectively.

A.

M1	M2	M3	Output
1	1	0	0
0	1	0	1
0	1	1	0
1	0	1	0
1	1	1	1

B.

M1	M2	M3	Output
1	1	0	1
0	1	0	0
0	1	1	1

1	1	1	1

C.

M1	M2	M3	Ouput
1	1	0	1
0	1	0	1
0	1	1	1
1	0	1	0
1	1	1	1

D. None of these

Solution: (C)

Follow the steps in question number 20,21 and 22.

Q24. Which of the following are correct statement(s) about stacking?

1. **A machine learning model is trained on predictions of multiple machine learning models**

2. **A Logistic regression will definitely work better in the second stage as compared to other classification methods**

3. **First stage models are trained on full / partial feature space of training data**

A.1 and 2

B. 2 and 3

D. All of above

Solution: (C)

1. In stacking, you train a machine learning model on predictions of multiple base models.

2. It is not necessary – we can use different algorithms for aggregating the results.

3. First stage models are trained on all the original features.

Q25. Which of the following are advantages of stacking?

- **More robust model**

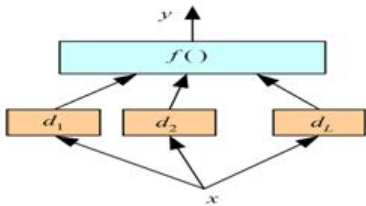- **better prediction**

- **Lower time of execution**

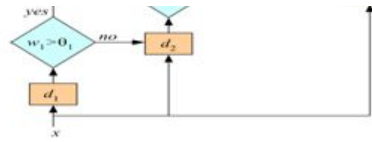A. 1 and 2

B. 2 and 3

C. 1 and 3

D. All of the above

Solution: (A)

Option 1 and 2 are advantages of stacking whereas option 3 is not correct as staking takes higher time.

Q26: Which of the following figure represents stacking?

A.

B.

C. None of these

Solution: (A)

A is correct because it is aggregating the results of base models by applying a function f (you can say a model) on the outputs of d1, d2 and dL.

Q27. Which of the following can be one of the steps in stacking?

1. Divide the training data into k folds

2. Train k models on each k-1 folds and get the out of fold predictions for remaining one fold

3. Divide the test data set in "k" folds and get individual fold predictions by different algorithms

A. 1 and 2

B. 2 and 3

C. 1 and 3

D. All of above

Solution: (A)

The third option is not correct because we don't create folds for test data in stacking.

Q28. Which of the following is the difference between stacking and blending?

A. Stacking has less stable CV compared to Blending

B. In Blending, you create out of fold prediction

C. Stacking is simpler than Blending

D. None of these

Solution: (D)

Only option D is correct.

Q29. Suppose you are using stacking with n different machine learning algorithms with k folds on data.

Which of the following is true about one level (m base models + 1 stacker) stacking?

Note:

- **Here, we are working on binary classification problem**

- **All base models are trained on all features**

- **You are using k folds for base models**

    A. You will have only k features after the first stage

    B. You will have only m features after the first stage

    C. You will have k+m features after the first stage

    D. You will have k*n features after the first stage

    E. None of the above

Solution: (B)

If you have m base models in stacking. That will generate m features for second stage models.

Q30. Which of the following is true about bagging?

    1. Bagging can be parallel

    2. The aim of bagging is to reduce bias not variance

    3. Bagging helps in reducing overfitting

    A. 1 and 2

    B. 2 and 3

    C. 1 and 3

    D. All of these

Solution: (C)

1. In bagging individual learners are not dependent on each other so they can be parallel

2-3 The bagging is suitable for high variance low bias models or you can say for complex models.

A. True

B. False

Solution: (B)

In boosting you always try to add new models that correct previous models weaknesses. So it is sequential.

Q32. Below are the two ensemble models:

1. E1(M1, M2, M3) and

2. E2(M4, M5, M6)

Above, Mx is the individual base models.

Which of the following are more likely to choose if following conditions for E1 and E2 are given?

E1: Individual Models accuracies are high but models are of the same type or in another term less diverse

E2: Individual Models accuracies are high but they are of different types in another term high diverse in nature

A. E1

B. E2

C. Any of E1 and E2

D. None of these

Solution: (B)

We have to select E2 because it contains diverse models. So option B is a correct option.

Q33. Suppose, you have 2000 different models with their predictions and want to ensemble predictions of best x models. Now, which of the following can be a possible method to select the best x models for an ensemble?

A. Step wise forward selection
B. Step wise backward elimination
C. Both
D. None of above

Solution: (C)

you will start with full set of features and remove model predictions one by one if after removing the predictions of model give an improvement in accuracy.

Q34. Suppose, you want to apply a stepwise forward selection method for choosing the best models for an ensemble model. Which of the following is the correct order of the steps?

Note: You have more than 1000 models predictions

> **1. Add the models predictions (or in another term take the average) one by one in the ensemble which improves the metrics in the validation set.**
> **2. Start with empty ensemble**
> **3. Return the ensemble from the nested set of ensembles that has maximum performance on the validation set**

> A. 1-2-3
> B. 1-3-4
> C. 2-1-3
> D. None of above

Solution: (C)

Option C is correct.

**Q35. True or False: Dropout is computationally expensive technique w.r.t. bagging**

A. True
B. False

Solution: (B)

Because in dropout, weights are shared and the ensemble of subnetworks are trained together.

Q36.Dropout in a neural network can be considered as an ensemble technique, where multiple sub-networks are trained together by "dropping" out certain connections between neurons.

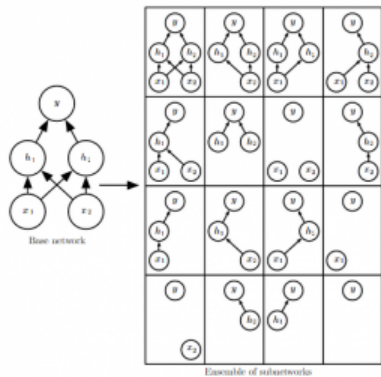**Suppose, we have a single hidden layer neural network as shown below.**
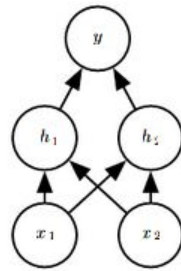
How many possible combinations of subnetworks can be used for classification?

A. 1

B. 9

C. 12

D. 16

E. None of the above

Solution: (B)

There are 16 possible combinations, of which only 9 are viable. Non-viable are (6, 7, 12, 13, 14, 15, 16).

Q37. How is the model capacity affected with dropout rate (where model capacity means the ability of a neural network to approximate complex functions)?

B. Model capacity decreases in increase in dropout rate

C. Model capacity is not affected on increase in dropout rate

D. None of these

Solution: (B)

The subnetworks have more number of neurons to work with when dropout rate is low. So They are more complex resulting in an increase in overall model complexity. Refer chap 11 of DL book.

Q38. Which of the following parameters can be tuned for finding good ensemble model in bagging based algorithms?

1. **Max number of samples**
2. **Max features**
3. **Bootstrapping of samples**
4. **Bootstrapping of features**

A. 1 and 3

B. 2 and 4

C. 1,2 and 3

D. 1,3 and 4

E. All of above

Solution: (E)

All of the techniques given in the options can be applied to get the good ensemble.

Q39. In machine learning, an algorithm (or learning algorithm) is said to be unstable if a small change in training data cause the large change in the learned classifiers.

True or False: Bagging of unstable classifiers is a good idea.

A. True

B. False

Solution: (A)

Q40. Suppose there are 25 base classifiers. Each classifier has error rates of e = 0.35.

Suppose you are using averaging as ensemble technique. What will be the probabilities that ensemble of above 25 classifiers will make a wrong prediction?

Note: All classifiers are independent of each other

    A. 0.05
    B. 0.06
    C. 0.07
    D. 0.09

Ans: B

Solution:

Refer this link

End Notes

I hope you enjoyed taking the test and found the solutions helpful. The test focused on conceptual as well as practical knowledge of ensemble modeling.

If you have any doubts in the questions above, let us know through comments below. Also, If you have any suggestions or improvements you think we should make in the next skill test, you can let us know by dropping your feedback in the comments section.

Learn, compete, hack and get hired!

Ankit Gupta

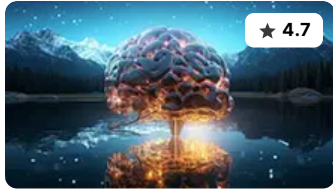Advanced | Interview Prep | Machine Learning | Python | Python | R | Skilltest

Free Courses

★ 4.7

Generative AI - A Way of Life

Explore Generative AI for beginners: create text and images, use top AI tools, learn practical skills, and ethics.

★ 4.5

Getting Started with Large Language Models

Master Large Language Models (LLMs) with this course, offering clear guidance in NLP and model training made simple.

★ 4.6

Building LLM Applications using Prompt Engineering

This free course guides you on building LLM apps, mastering prompt engineering, and developing chatbots with enterprise data.

★ 4.8

Improving Real World RAG Systems: Key Challenges & Practical Solutions

Explore practical solutions, advanced retrieval strategies, and agentic RAG systems to improve context, relevance, and accuracy in AI-driven applications.

Microsoft Excel: Formulas & Functions

Master MS Excel for data analysis with key formulas, functions, and LookUp tools in this comprehensive course.

RECOMMENDED ARTICLES

[45 Questions to Test a Data Scientist on Basics...](#)

[Bagging, Boosting and Stacking: Ensemble Learni...](#)

[Solutions for Skilltest Machine Learning : Reve...](#)

[5 Easy questions on Ensemble Modeling everyone ...](#)

[45 questions to test Data Scientists on Tree Ba...](#)

[30 Questions to Test a Data Scientist on Tree B...](#)

[How to build Ensemble Models in machine learnin...](#)

[Exploring Ensemble Learning in Machine Learning...](#)

[Basics of Ensemble Learning Explained in Simple...](#)

[Top Interview Questions on Voting Ensembles in ...](#)

Submit reply

Saikiran

Hi Ankit, Thanks for the solutions. It was a very good skilltest and was a very good learning experience. Just a small help: The links in the solutions for Questions 39 and 40 appear to be not working. Could you please fix that? Thanks, Sai

💬 1   Show 1 reply

Q37) Shouldn't the answer be B as increasing the dropout rate will reduce the model capacity.
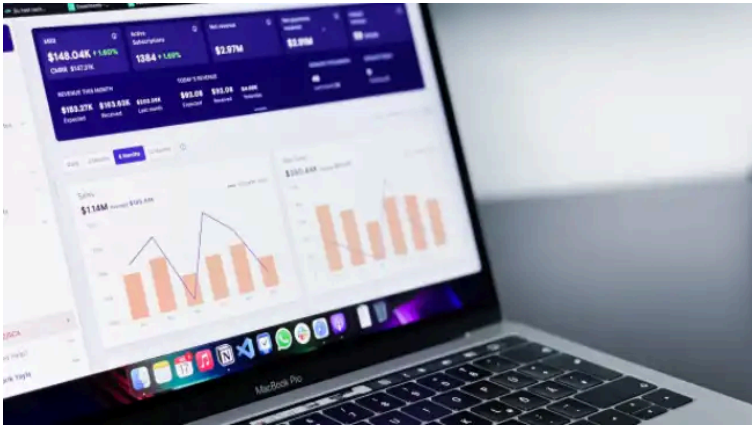
💬 1   Show 1 reply

Skill tests – Datafuture

[...] You can find the questions and solutions to ensemble learning skill test

Write for us →

Write, captivate, and earn accolades and rewards for your work

- Reach a Global Audience
- Get Expert Feedback
- Build Your Brand & Audience

- Cash In on Your Knowledge
- Join a Thriving Community
- Level Up Your Data Science Game

Flagship Courses

GenAI Pinnacle Program | AI/ML BlackBelt Courses

LlamaIndex | Stability.AI | MidJourney | Building Production Ready RAG systems using LlamaIndex | Building LLMs for Code | Deep Learning | Python | Microsoft Excel | Machine Learning | Decision Trees | Pandas for Data Analysis | Ensemble Learning | NLP | NLP using Deep Learning | Neural Networks | Loan Prediction Practice Problem | Time Series Forecasting | Tableau | Business Analytics

Popular Categories

Generative AI | Prompt Engineering | Generative AI Application | News | Technical Guides | AI Tools | Interview Preparation | Research Papers | Success Stories | Quiz | Use Cases | Listicles

Generative AI Tools and Techniques

GANs | VAEs | Transformers | StyleGAN | Pix2Pix | Autoencoders | GPT | BERT | Word2Vec | LSTM | Attention Mechanisms | Diffusion Models | LLMs | SLMs | StyleGAN | Encoder Decoder Models | Prompt Engineering | LangChain | LlamaIndex | RAG | Fine-tuning | LangChain AI Agent | Multimodal Models | RNNs | DCGAN | ProGAN | Text-to-Image Models | DDPM | Document Question Answering | Imagen | T5 (Text-to-Text Transfer Transformer) | Seq2seq Models | WaveNet | Attention Is All You Need (Transformer Architecture)

Popular GenAI Models

Llama 3.1 | Llama 3 | Llama 2 | GPT 4o Mini | GPT 4o | GPT 3 | Claude 3 Haiku | Claude 3.5 Sonnet | Phi 3.5 | Phi 3 | Mistral Large 2 | Mistral NeMo | Mistral-7b | Gemini 1.5 Pro | Gemini Flash 1.5 | Bedrock | Vertex AI | DALL.E | Midjourney | Stable Diffusion

Data Science Tools and Techniques

Python | R | SQL | Jupyter Notebooks | TensorFlow | Scikit-learn | PyTorch | Tableau | Apache Spark | Matplotlib | Seaborn | Pandas | Hadoop | Docker | Git | Keras | Apache Kafka | AWS | NLP | Random Forest | Computer Vision | Data Visualization | Data Exploration | Big Data | Common Machine Learning Algorithms | Machine Learning

Company	Discover	Learn
About Us	Blogs	Free Courses
Contact Us	Expert Sessions	AI&ML Program
Careers	Learning Paths	GenAI Program
	Comprehensive Guides	Agentic AI Program

Engage	Contribute	Enterprise
Community	Become an Author	Our Offerings
Hackathons	Become a Speaker	Trainings
Events	Become a Mentor	Data Culture
Podcasts	Become an Instructor	AI Newsletter

Personalized GenAI Learning Path 2025✨ Crafted Just for YOU!