PDP Teaching Plan - 2018 Team 13

Your teaching plan is the document that your team will use during teaching. It is also the document that PDP instructors use to evaluate both your progress throughout the PDP and your design at the end of the PDP. For this reason, please keep this document up-to-date. The deadlines for completing various components of your activity are outlined in the 2018 PDP Design Milestones table.

The five major components of an inquiry activity are included in this template. You will likely have other components. The blue text includes information from ISEE to help you create a comprehensive outline, and should not be deleted. Use black or other color text for your own work.

Activity name:

Machine learning - decision tree learning

Team members (names and contact info):

GL (me)

GR (removed actual name and contact info for privacy)

LA (removed actual name and contact info for privacy)

Venue and learner info

(copy from Design Notebook)

Teaching venue:

Akamai PREP #2 Computer Science

UH Hilo, June 17-20, 2018 **(Teaching June 18, 19)**

Discipline: Computer Science

How many learners you expect to teach:

38 (19 each day)

What you know about learners' level and background:

STEM undergrads

Content learning outcomes:

Articulated in a way that identifies how learners will demonstrate their understanding (e.g. Learners will use the concept of intermolecular forces to explain results of thin layer chromatography experiments). Also includes a rationale for why concept was chosen, and some difficulties students have with it (including any citations to the literature).

Refer to these sections in your Design Notebook:

- Content Design Tool
- Working with Goals & Rubrics

Put your content learning outcome (and its bulleted dimensions) here:

Build a decision tree to accurately predict a desired attribute of a dataset. Explain or justify how your decision tree solves this predictive problem and maximizes the prediction accuracy.

Practice learning outcomes:

Includes a core practice and the specific dimensions that are the focus of the activity. Also includes a brief description of what learners struggle with, or what is challenging or nuanced about this practice, and could include a citation to the literature.

Refer to these sections in your Design Notebook:

- Practice proposal
- Scaffolding STEM Practices (Inquiry Institute)
- Working with Goals & Rubrics

Put your practice learning outcome (and its bulleted dimensions) here:
Optimization

- Deciding on a metric to optimize
- Identifying which variables are most important in the optimization
- Trade-offs between metrics in the optimization

Equity and Inclusion Design Approach

Describe a research-grounded inquiry design approach that supports equitable and inclusive learning, and considers learners from marginalized backgrounds. In your post-teaching report you will be asked to expand on this and further connect it to the research on equitable and inclusive teaching.

Refer to these sections in your Design Notebook:

- Inquiry Institute, E&I Sessions Day 1 and Day 3,
- Equity and Inclusion Design Approach
- Design Institute Day 2, E&I Session Part 2,
- Equity and Inclusion Design Approach

Put your E&I Design Approach here:

Promote growth mindsets:

- Context the design to let students know that there will be iterations to promote incremental learning.
- Give feedback at various iterations.

Details:

1. During the introduction we will mention that we've designed the activity so that they do not need a CS (or related background).
2. We will describe what a growth mindset is about.
3. We will encourage students to be aware and keep a growth mindset throughout the activity.
4. The actual investigation should promote incremental learning
    a. Starting with a toy dataset so students will get the concept of building a model.
        i. Introduce a metric to measure the goodness of the model.
        ii. Ask students to iterate on the model to get the best one.
    b. Introduce Google Colab for Python programming that can be used right away without needing to install libraries.
    c. Provide a partially filled-out Python program with prompts that guide students on what to do next, while referring back to things they learned during the toy dataset.
        i. Provide enough code so they are not starting from scratch. This allows students to focus on problem solving and not programming.
        ii. Encourages students to look up documentation like most scientists do.
    d. We will have thinking tools for the entire class where we go over different key concepts.

Additional items (part of design):

- Encourage collaborations:
    - Investigation: work in pairs or 3-person teams
    - CAT: jigsaw
- Individual and group contributions:
    - Every student will get to work on their laptop, but they need to discuss things and consolidate results as a group. Each teacher will share one Python script (jupyter notebook).

Overview of your Inquiry Activity:

Overview includes an overall schedule, including time blocks and who leads which pieces.

Time	Task	Leads
8:45 - 9:30	Prep	All
9:30 - 9:45	CS ML - Intro (15 min)	All (Grace leads)
9:45 - 10:00	CS ML - Raising questions (15 min)	GR
10:00 - 10:10	CS ML - Thinking tool (10 min)	GR
10:10 - 10:15	CS ML - Team formation (5 min)	Grace
10:15 - 10:45	CS ML - Investigation 1 - toy problem (30 min)	All (walk around)
10:45 - 11:00	CS ML - Thinking tool - accuracy calculation (15 min)	Grace
11:00 - 11:30	CS ML - Investigation 1 - cont. (30 min)	All (walk around)
11:30 - 11:45	CS ML - Thinking tool - Introduce real world data and Python jupyter notebook with Google Collab, sklearn, etc. (15 min)	LA
11:45 - 12:45	Lunch for 38 interns + 12 staff (50 total) - Medical + Registration	All
12:45 - 1:30	CS ML - Recap + Investigation 2 - real world problem (30 min)	All (LA leads; walk around)
1:30 - 1:40	CS ML - [Facilitate as necessary] Checkpoint - train/test, model complexity tradeoff (10 min)	All (walk around)
1:40 - 2:30	CS ML - Investigation 2 - cont. (50 min)	All (walk around)
2:30 - 2:40	CS ML - [Facilitation as necessary] Checkpoint - predict with new data (10 min)	All (walk around)
2:40 - 3:00	CS ML - Investigation 3 - predict and reflect on new outcome (20 min)	All (walk around)
3:00 - 3:15	CS ML - Individual worksheet + prep for jigsaw (15 min)	LA
3:15 - 3:45	CS ML - Jigsaw presentation (3 groups) - CAT (30 min)	All (separate group)
3:45 - 4:00	CS ML - Synthesis + practice reflection (15 min)	All (Grace leads, but all will talk)

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Introduction

<u>Description:</u> The Introduction describes what learners should expect, what they will do during the activity, and the role of the instructors

The introduction should also include:

- What learners should gain in relation to content and STEM practices
- How activity mirrors authentic STEM practice
- Background information that is needed to engage in activity
- An overall timeline for the activity

A comprehensive outline in this section will describe how the Introduction meets the above requirements, and includes**:**

- Bulleted list of major points to be included
- Any particular facilitation strategies or emphases particularly relevant for the introduction

Refer to these sections in your Design Notebook:

- Introducing the Activity (Design Institute)

Outline your Introduction here:

1. Introduce the activity based on our content goal (decision tree modeling) and STEM practice (optimization). **Introduce the content prompt.**
    a. The content goal will be helpful for anyone interested in learning more about machine learning, which is a key skill to have given the big data age.
    b. The STEM practice will be helpful for engineers in general who constantly need to think about tradeoffs and optimization.
2. Describe inquiry education as a way to mirror authentic STEM practice.
    a. Guided investigation but mostly hands-off.
    b. See Facilitation notes below.
3. Introduction to machine learning and its wide application.
    a. Mention that our activity will help introduce one out of many ML algorithms.
4. Go through the timeline of our activity.

Facilitation Notes:

What to say (inspired by Anne's 2nd day intro):

- Investigating is a creative process and you are likely to hit some difficulties as well as breakthroughs, these difficulties are a normal part of the process, and understanding that they are a normal part of the process will prepare you if you hit some rough patches.

- If you get stuck: talk to facilitator, check in with other groups, reflect on experience (oral/written), take a break/distance
- Getting stuck can be frustrating, it can also be exciting, on the verge of learning something new. Feel you ‘should’ know how something works and doesn’t work that way, give up OR change the way you think about it. Getting stuck in a natural part of the process, not doing anything wrong, on the other side can be the joy of having learned something new

Raising Questions

<u>Description:</u> The essential function of the Raising Questions component is to stimulate learners to raise "how" or "why" questions *that are later investigated.*

The key to a good Raising Questions component is that it gets learners to ask not just any question, but questions that can be pursued in the Investigation phase.

In addition to stimulating learners to raise specific questions, a well-designed Raising Questions component can also serve other important functions, including:

- Leading to multiple potential pathways that learners can choose from during Investigations
- Making learners' thinking visible through the questions they ask, allowing them to express prior understanding and enabling formative assessment
- Catching learners' interest

A comprehensive outline in this section will describe how the Raising Questions component meets the above requirements, and includes**:**

- Bulleted list or actual script of contexting
- Description of what instructors will say, demonstrate, point out to learners during Raising Questions
- A few examples of questions *learners should ask*, as a result of Raising Questions
- What learners will need to notice that will stimulate them to ask those questions
- How the Raising Questions component engages learners of different backgrounds
- How questions are handled so all learners' ideas are honored.
- Notes on facilitating, including:
    - What instructors are assessing
    - How your Raising Questions component will enable you to find out about your learners' prior knowledge/experience
    - What can be said or done if learners are not asking "the right" questions

Refer to these sections in your Design Notebook:

- Raising Questions Design Tool (from Design Institute)

Outline your Raising Questions component here:

1. Present a toy dataset (as slides) and describe the features (X, Y, Z) and the target variable (A) for the entire class.
2. The dataset will show some obvious correlations between features and the target. We ask students to study the data for a minute.

3. Ask students to brainstorm:
    a. What questions can you answer from this dataset? (What can be predicted given all these features?)
    b. What would you like to know or find out? (What would you like to predict?)
    c. Are there relationships among the features? (What are the most informative features for such predictive variable?)
4. Ideally students should ask questions something like the following:
    a. Can you predict A given X, Y, Z (or a subset of it)?
    b. How many features do we need to predict A?
    c. I think features X, Y, Z will have a significant effect on A.
    d. I don't think features X, Y, Z will have any effect on A.

Facilitation Notes:

- Students might talk about features outside of the dataset. → Facilitators will ask students to focus only on the data presented.
- Students might not talk about the predictive component → Facilitators will ask direct questions towards prediction.
- Students might ask about "how" to predict something → Facilitators will tell them that will be addressed during the investigation and we will focus on the data here.

Investigations

<u>Description:</u> The Investigations component of an inquiry activity provides an opportunity for learners to plan and carry out their own way to find out something and produce evidence that will support their findings.

An effective Investigation component will:

- Enable each learner to come to an understanding of the intended content
- Be an opportunity for learners to investigate a question or problem that is treated as unresolved, rather than students simply reproducing known results
- Enable learners to decide on steps taken in investigation, rather than following set instructions
- Challenge learners to use a STEM practice to understand content
- Enable learners to work constructively in teams (in some cases learners may choose their role on a team, while in other examples roles may be structured explicitly)
- Enable facilitators to formally assess teams and individuals

A comprehensive outline of this section will describe how Investigation component meets the above requirements and includes:

- Bulleted list or actual script of contexting
- Final prompt and/or plan for investigation team formation
- Final prompt for the overall task to be completed during investigations
- Other prompts for any sub-components
- Your Practice Rubric, if the investigation phase is likely to be the component in which learners most deeply engage with the practice. (If this is not so in your design, please paste your practice rubric into the appropriate place.)

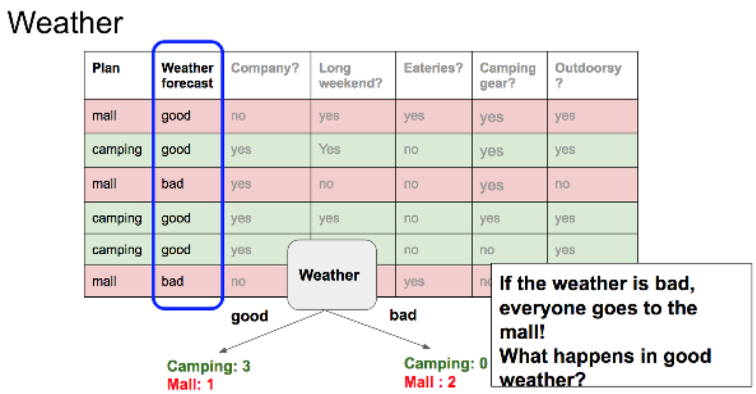
Refer to these sections in your Design Notebook:

- Designing Inquiry Investigations Design Tool (Inquiry Institute)
- Focusing on Investigations Design Tool (Design Institute)

Outline your Investigation component here:

1. Team formation:
    a. Survey ahead of time (Google form sent out end of first day) so we can make sure at least half of students have programming experience.
    b. Ask students to form groups of 2, with one group of 3 (9 teams total).
        i. At least one person in the group should have programming experience.

    c. Each facilitator will have dedicated groups but available for each other in case of questions.
2. Re-iterate the content prompt.
3. **Thinking tool** - show examples of toy data and how to construct a tree.
    a. Here we are trying to predict whether someone will go to the mall or will go camping. The features to consider are weather forecast, company, long weekend, etc. This slide highlights the feature "weather forecast" to start building the decision tree:



4. **Investigation 1** - students will work with the toy problem and create a decision tree on their own by hand.
5. **Thinking tool** - introduce the metric "accuracy" as a way to measure model goodness. Show how to calculate this for a simple decision tree.
    - Accuracy (%) = number of correctly classified data points / all data points * 100
6. **Investigation 1 (cont.)** - students will calculate accuracy of their hand-developed decision tree. They will modify the tree as needed.
    a. Introduce content prompt - this will stay for all remaining investigations.
7. **Thinking tool** - Introduce real world dataset, Python jupyter notebook with Google collab, Python ML library scikit-learn, etc. Context with the iterative nature of creating the model and how computers can help.
    a. Iterative nature of model creation and adapting computers to help.
    b. Real world dataset will be much larger than the toy problem.
    c. Introduce Python as the programming language, and Python jupyter notebook and Google collab as the programming framework.
    d. Introducing Python ML library: scikit-learn.
    e. Introducing sklearn's decision tree algorithm - brief.
8. Introducing the practice rubric.

9. **Investigation 2** - students will go through the notebook and follow the instructions and prompts.
    a. Includes exploratory data analysis.
    b. See facilitation notes on encouraging students to look up information on their own.
    c. Facilitators will walk around and answer questions as needed.
10. [Facilitation as needed] **Checkpoint** - train/test datasets, model complexity (depth of tree), trade-off plot.
    a. Why split into train/test dataset.
    b. Model complexity with parameter: depth of tree.
    c. Trade-off plot for accuracy vs. model complexity for train/test dataset.
11. **Investigation 2 (cont.)** - students continue with exploring models and trade-off plots.
    a. Remind students about the content prompt.
    b. Students will need to pick a best/final model and back it up with a trade-off plot.
12. [Facilitation as needed] **Checkpoint** - predict outcome given new data with their final model.
13. **Investigation 3** - predict and reflect predicted/new outcome
    a. Give students new dataset (1 or a few data points)
    a. Ask students to use their final model to predict the new outcome.
    b. Ask students to reflect on the results. Are they surprised by the result? If they don't agree with the results, why not? What could lead to the problem?

Facilitation Notes: (recall from the Facilitation Workshop that you also planned to address particular E&I foci in your personal facilitation; notes on that may be appropriate here)

Encourage students to look up information online on their own. This is relevant for practice data scientists - we spent a lot of time online looking up information on our own. There will be prompts on the Python jupyter notebook to encourage this as well.

Practice rubric:
Use this template for your rubric, or paste in your own version. You may also copy and paste from your Design Notebook.
(If the investigation phase is not where the practice is most emphasized, please move this to the more appropriate place.)

Dimensions of core practice:	Lack of evidence did not observe learners enough to decide between A and B	Evidence of difficulty what it looks like when a learner needs to work more on the practice	Evidence of proficiency what it looks like when a learner is proficient with the practice
Describe and use a metric to determine model goodness. (For our content: accuracy.) (Originally: Deciding on a metric to optimize.)		- Unable to describe the metric. - Unable to determine the model goodness based on the metric. (Originally: - Can not describe what makes a model "good")	- Able to describe the metric. - Able to determine the model goodness based on the metric.
Identify and justify important features in the model. (For our content: do this at least for the root node) (Originally: Identifying which variables are most important in the optimization.)		- Did not identify important variables. - Did not justify important variables: did not test test all variables to determine important variables; instead rely on intuition or only testing a few variables.	- Identified important variables. - Justified important variables: experimented with all variables rather than testing a few or rely on intuition.
Perform trade-offs between the metric and another desirable but incompatible property of the model to optimize for the best model. (Originally: Trade offs between metrics in the optimization.)		- did not understand the two properties used in the tradeoff. - did not compare the two properties (i.e., only focused on one). - did not notice the relationship between the two properties (i.e., not noticing one increases while the other decreases)	- understood the two properties used in the trade-off. - compared two properties. - noticed the relationship between the two properties. - used the relationship to pick the best model. (- compare different metrics and notice how they are related to each other)

		- did not use the relationship to pick the best model.	

Revised version for students:

Dimensions of practice: optimization	Things to notice
Describe and use a metric to determine model goodness.	- Describe the metric - what does it mean, how to calculate. - Apply to the model and calculate the results.
Identify and justify important features in the model.	- How to decide whether a feature is important? (Do this at least for the root node for our content)
Perform trade-offs between two desirable but incompatible property of the model to optimize for best model.	- What are the two properties used for trade-off in this case? - What is the relationship between them? - How to optimize for best model using this trade-off?

Culminating Assessment Task

<u>Description:</u> A Culminating Assessment Task prompts learners to use evidence they produced to demonstrate their understanding of a content goal.

In addition, an effective Culminating Assessment Task will:

- Engage learners in a task similar to how people report findings in authentic STEM
- Provide multiple ways for learners to explain findings or a solution, not just an "answer"
- Be assessed by instructors using a rubric or other pre-designed format
- Have each learner produce an individual artifact for assessment

Note that in your ISEE Post-Teaching Report, you will need to be able to summarize

- Learning outcomes
- Rubrics
- How learners did, in practice
- Artifact(s)
- Scores

So make sure your CAT does everything it needs to do!

A comprehensive Culminating Assessment Task section will describe how it meets the above requirements, and includes:

- Bulleted list or actual script of contexting
- Final CAT prompt, which includes Content Prompt
- How the CAT will ask learners to produce an artifact, and what that artifact will be
- Plan(s) for how/when facilitators will assess learners and artifacts
    - During the CAT
    - After
- Examples of learner artifacts that could be assessed
- Final content rubric
- Final practice rubric if the practice is also assessed in the CAT

Refer to these sections in your Design Notebook:

- Culminating Assessment Task Design Tool (Inquiry & Design Institute)

Copy your content prompt here, and add any additional instructions to learners (e.g., how to format their response):

(Note: Introduced at introduction and again at the beginning of investigation)

Build a decision tree to accurately predict a desired attribute of a dataset. Explain or justify how your decision tree solves this predictive problem and maximizes the prediction accuracy.

- Present your final model accuracy and supporting artifacts
    - Visualization of the final decision tree model
    - Trade-off plot that supports your decision on such pick
- Present your new prediction on the new dataset and summarize your thoughts.

Outline your Culminating Assessment Task, rubrics, and team plan for assessing the learners using the rubrics:

Students will be divided into 3 jigsaw groups (with 3 facilitators):

- 19 students / 3 = 6 or 7 students per group per day

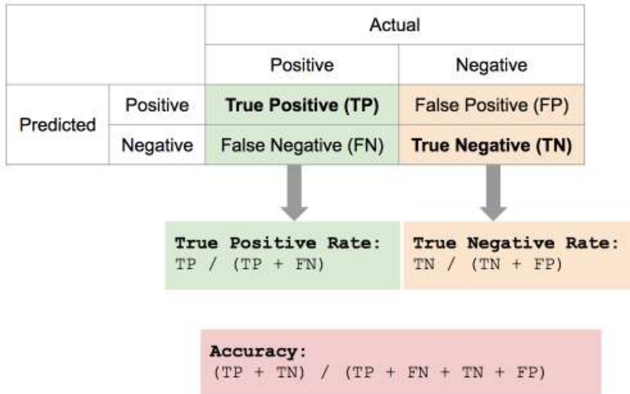
Each facilitator will ask each student of the group to show supporting information to answer the content prompt.

Backup questions to go through and check off for individual presentations:

1. The final decision tree (picture saved on their computer).
2. Briefly describe the tree (what is the root node, depth of the tree, etc.).
3. Accuracy of the tree.
4. Trade-off plot of accuracy and depth of tree.
5. Point out why they picked the final tree based on the plot.
6. Prediction on the new data points.
7. Their thoughts on the new predictions.
    a. Does the result make sense? Why or why not.
    b. Is it what they expected? Why or why not.
8. [If finished early] Brainstorm: Possible additional data collection that could alter the prediction results.
    a. Crime statistics, economy/job growth, average age of community, school availability and rating, etc.
    b. Possible bias from including any of the above.

Facilitation Notes:

- Encourage students to question the prediction results with given data.
- If prediction results are high, should they trust it?
    - Prediction might be skewed towards one class: true positive rate might be much higher or true negative rate is much higher
    - Below is the confusion matrix and the calculations **(FOR FACILITATOR REFERENCE ONLY, WILL NOT SHOWN TO STUDENTS.)**



- If prediction results are low, they should question it.
- When is it okay to (temporarily) accept a low accuracy score?
    - Perhaps if it is the state-of-the-art given that particular application. After all, there's no "perfect" data.

Content rubric:

Use this template for your rubric, or paste in your own version (leave the "M" in, but you may have a different scale, like 0-3). You may also copy and paste from your Design Notebook.

Dimensions: Components or "knowledge statements"	M evidence needed to make a judgment is missing	0 evidence that learner has misunderstanding or incomplete understanding	1 evidence that learner has sufficient understanding	Score
A decision tree predicts a desired attribute of a dataset.		- Can't describe what the input or output of the model. - Can't describe the attribute trying to predict.	- Can describe what the input and output of the model is. - Can describe the attribute trying to predict.	
The process of choosing the "best" feature to split the tree on at each level.		- They can't describe a procedure to select features to split the nodes and continue growing the tree. - Didn't compare all features; going with intuition or just tried a	- They can describe a procedure that they use to split the nodes and grow the tree: go through each feature, split on some value of the feature, calculate accuracy.	

		few features randomly - Picked a node but didn't check how it maximizes the accuracy.	Pick the feature/split with the best accuracy. (see *) - Compared all features for splits by calculating resulting accuracies. - Picked nodes that give highest accuracy.	
A metric to split the tree on is accuracy.		- Doesn't know how to calculate. - Calculated incorrectly (didn't get number of correct examples or not understanding what is accuracy)	- Shows number of correct examples divided by number of all examples.	
Tradeoffs between accuracy and complexity of the model.		- Tree is too simple (underfit) or too complex (overfit) - not thinking about tradeoffs between complexity and accuracy. Don't know how to plot complexity of the tree vs. accuracy. - Has the plot but can't figure out which model is the best. - Has the plot but pick the wrong tree.	- Model is "just right" - Doesn't underfit or overfit. Overfit happens when test data accuracy starts to decrease while training data accuracy continues to increase. (See **) - pick the simplest tree while retaining the best accuracy - Shows a plot of the complexity of the tree vs. accuracy and pick the correct tree to use.	
Total score				

`* Basic decision tree algorithm. For simplicity, just try one potential split of X and skip step 5.`

```
Basic Decision Tree Algorithm

  1. Select a node
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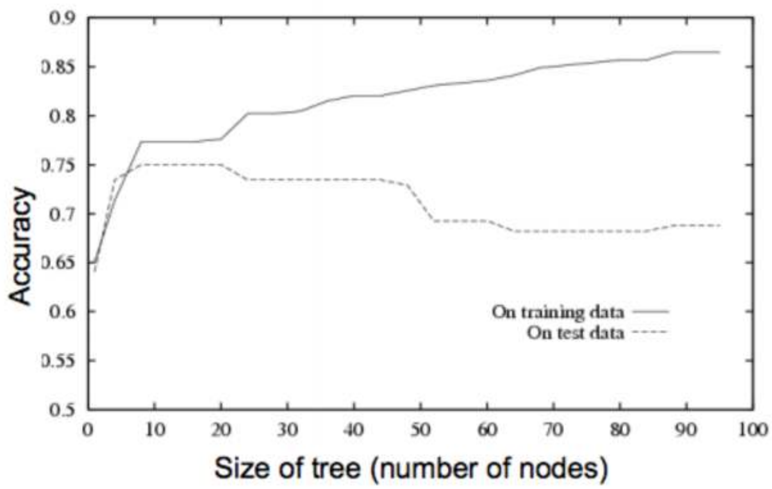
```
    2. Select a feature X
    3. Pick a potential split of X
    4. Measure the accuracy of the current model
    5. Repeat 3 and 4 until “maximum” accuracy
    6. Repeat 2 to 5 for all features
    7. Use best splitting feature for the node
    8. Split node using this feature
    9. Go to each child node and repeat 2 to 8

Stopping criteria
    -   Each node contains examples of one class
    -   Ran out of features
    -   No further significant increase in accuracy
```

** In this example overfitting starts around the size of the tree = 20 because the accuracy on test data starts to decrease, while the accuracy on training data continues to increase.



Modified for students:

Content rubric	Things to notice
A decision tree predicts a desired attribute of a dataset.	- What is the input and the output of the model? - What are you trying to predict?
The process of choosing the “best” feature to split the tree on at each level.	- Describe the procedure that you used to create the tree. - How did you decide which feature to use for the root node? - Was it an intuition? - Did you pick features randomly?

	- How many features did you pick? - Did you try them all or just a few features? - How good is the model once you decided on a feature for a node.
A metric to split the tree on is accuracy.	- What is the metric we decided to use? Can you describe it? - Can you apply to your model and get results?
Tradeoffs between accuracy and complexity of the model.	- Plot the two properties and observe the relationship. - Can you pick a best model based on this trade-off plot? - Why is it the best model?

Synthesis

<u>Description:</u> An inquiry Synthesis synthesizes the collective understanding of the group and recognizes learners' contributions.

In addition, an effective Synthesis will:

- Tie together the content goal with understandings that learners gained during investigations, specifically by acknowledging different groups' contributions
- Stimulate learners to reflect on what they learned about a STEM practice, and its relevance outside of the activity
- Provide standard science or engineering language and ways of addressing things that learners came up with during their investigations.

A comprehensive outline of the Synthesis describes how it will meet the above requirements and includes:

- Bulleted list or actual script of contexting
- Bulleted list of key elements to be included in Synthesis

Refer to these sections in your Design Notebook:

- Designing Synthesis/Reflection on Practices Design Tool (Design Institute)

Outline your Synthesis here:

1. Talk about different prediction problems teams have worked on (mention the teams).
    a. Depending on the target they are trying to predict, some teams might have lower prediction accuracy than others (nature of the data)
2. Talk about teams' results
    a. accuracy, final tree, tradeoff plots, best model, etc.
    b. prediction on new data - teams' reflection may be different (some are surprised by the results, some are not)
    c. teams with low prediction accuracy **should** question the new prediction
3. There are other ML algorithms they can try.
    a. Decision trees might not be the best algorithm for all teams, especially the ones with low model accuracy.
    b. **But they can use the same practice (optimizing the model) for any other types of algorithm.** We will hand out practice rubric during the investigation so students can think about them throughout.
4. Show them different algorithms in scikit-learn. Take screenshots of examples.

    a. Code to call them (very similar syntax; e.g., SVM, naive bayes)
    b. Show them the documentation so they can learn more about different algorithms
5. Show students that they can apply this to other problems in the future.
6. Show various resources online (tutorials and projects) they can look up.
7. Show some cool examples of ML (state of the art).

Facilitation Notes:

Template for individual responses to Post-Teaching Report

After teaching, each participant must follow through with PDP post-teaching requirements. If you would like to collect your ideas in advance of submitting the individual Post-Teaching Report, here are the prompts to the major questions on the Report:

The following pages include the prompts to each of the major questions on the form:

(1) assessing how learners developed understanding of STEM content central to your activity
(2) assessing how learners' developed proficiency in the STEM practice emphasized within your activity
(3) design and facilitation toward equitable and inclusive learning
(4) DTLs only - inclusive leadership

Design Highlights (optional)

Design highlights are narrative descriptions of an aspect or component of an activity that demonstrates a participant's intentional design through the integration of an ISEE theme or other education research (e.g. How Learning Works, growth mindset, etc.). You may even find an opportunity to use them as part of an education job application.

Design Highlights should have design rationale. They can be based upon an activity component, but might also span multiple components. To make the designed aspect clear and compelling, Design Highlights often include a contrast with the way conventional STEM learning experiences are designed. Design Highlights should also include a brief reflection on how the designed aspect of the activity worked in practice towards achieving its desired outcomes.

If your team does choose to produce a Design Highlight, please put the final version on your individual team pages, under "other documentation."