

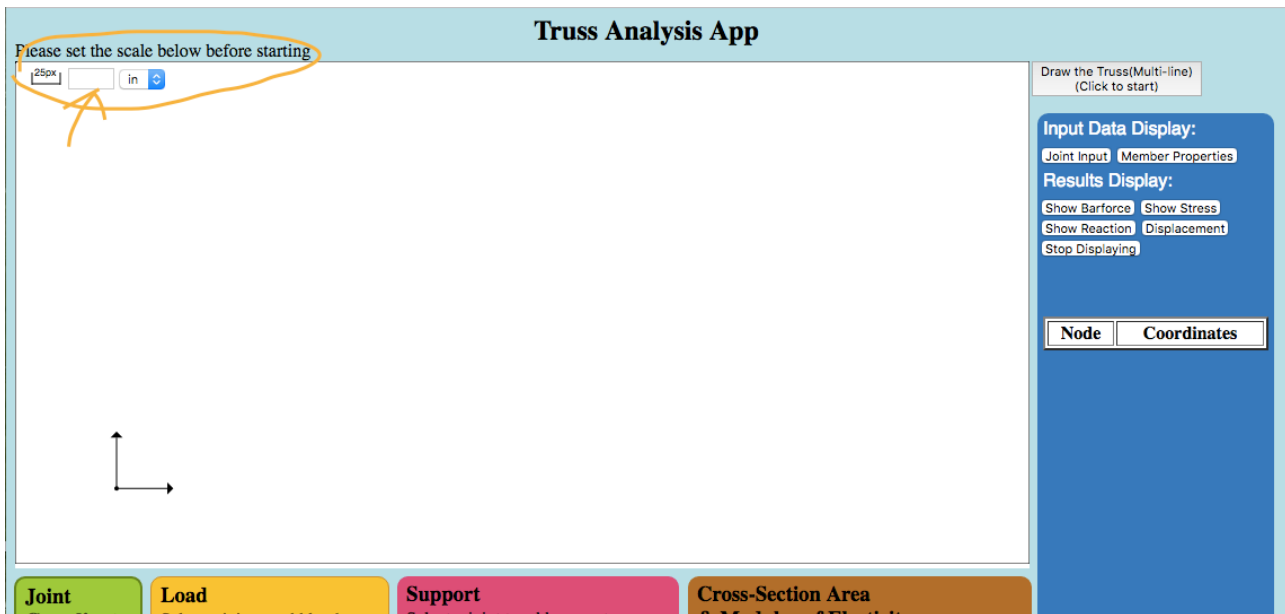
How-to-use Guide:

Step one: Go to biligeyang.github.io/truss-analysis

(Browser choice: Chrome or Firefox would perform well. IE is weird. Don't use IE.)

Step two: Set the scale on the upper left corner

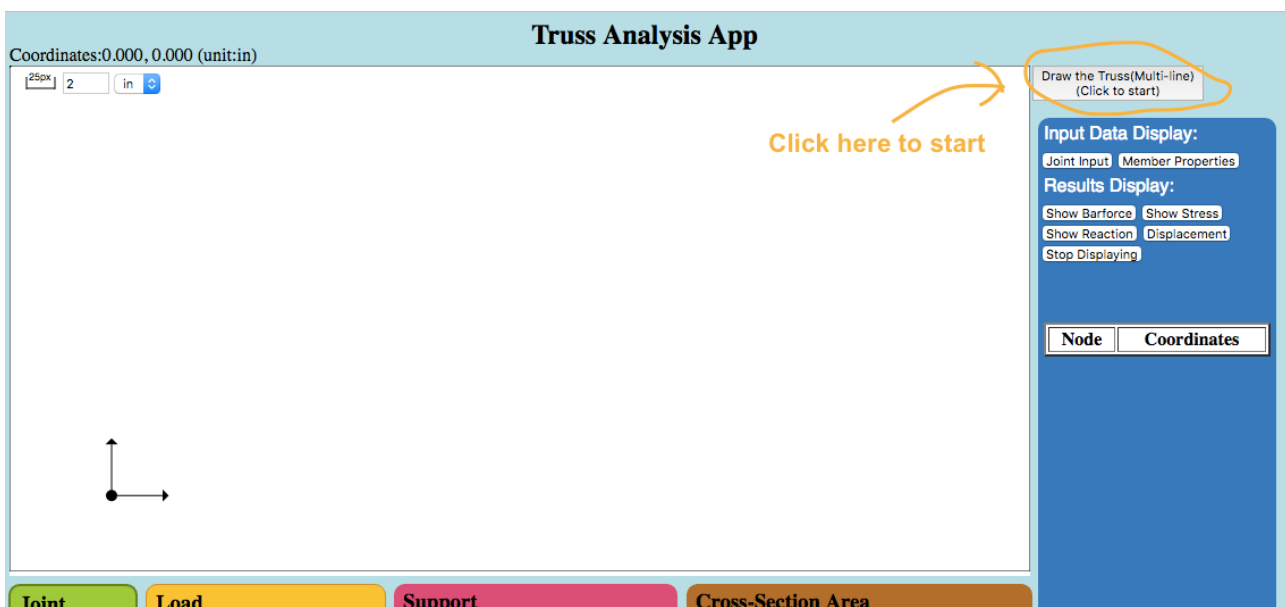
The scale determines how many inches every 25 pixels (about half an inch) on the screen would represent. For E6 lab, I think 2 or 3 inches would do.



Step Three: Start drawing

Click the button on the upper right corner and the drawing starts. Every click onto the white canvas will create a dot. If you move your mouse onto an existing dot or an existing line, they would highlight and **if you click on them when they are highlighted**, the new dot you created would join the highlighted dot or line.

Press Escape Key if you want to stop drawing.



Step Four: Editing existing points (Green Box)

1. You can **drag the points** with your mouse. As a point is dragged, its **coordinates would show** on the upper left corner.
2. You can also **click on a point**, which would turn its color into red. If there is **only one dot clicked**, you can see its coordinates showing up in the **green box** on the lower left corner. You can then **change the numbers** and **click on the update button**. (Important Note: press the Enter key won't update the numbers. **Click** on the button instead.)
3. To **unselect a point**, simply click on the white space.

Truss Analysis App

Coordinates: 21.040, 13.380 (unit: in)

25px | 2 | in

(I clicked on point 1)

Notice the color of the selected dot turning red

Change point 1's coordinates here

Joint Coordinates
X = 22.16
Y = 18.42
Update

Load
Now choose the direction of load:
→ ← ↑ ↓
Add Load lb

Support
Choose the support type or no support(X):
[Pin] [Roller] [Fixed] [None]
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

Input Data Display:
Joint Input Member Properties
Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160, 18.420)
2	(47.520, 19.060)
3	(34.800, 5.140)

Click on Update Button to update. Press Enter key won't work.

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Step Five: Add load (Yellow Box)

1. Click on the point at which you want to add load on.
2. Then in the **yellow box**, select one of the four directions of load by clicking on it.
3. Enter the value of load in pound.
4. Click "Add Load" Button.

Coordinates: 35.120, 28.020 (unit: in)

250x 2 in

Select a point first

Then use this box to add load

Press this button, and it will be added

Truss Analysis App

Draw the Truss(Multi-line)
(Click to start)

Input Data Display:
Joint Input Member Properties
Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160,18.420)
2	(47.520,19.060)
3	(34.800,5.140)

Joint Coordinates
X = 22.16
Y = 18.42
Update

Load
Now choose the direction of load:
→ ← ↑ ↓
2000 lb
Add Load

Support
Choose the support type or no support(X):
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

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To edit existing load:

1. Click on the red load arrow
2. If you want to change magnitude of load, change the number and click on update.
3. If you want to change the direction of the load, you will have to delete the load first by clicking on "Delete Load" Button. And then add the desired load again. (Sorry for the complexity)

Coordinates: 18.160, 17.540 (unit: in)

250x 2 in

(I clicked on the red load arrow)

2000 lb

Truss Analysis App

Draw the Truss(Multi-line)
(Click to start)

Input Data Display:
Joint Input Member Properties
Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160,18.420)
2	(47.520,19.060)
3	(34.800,5.140)

Joint Coordinates
X =
Y =
Update

Load
Select a joint to add load
Or click on a load to change it
→ ← ↑ ↓
2000 lb
Update Delete Load

Support
Select a joint to add support
Or click on a support to change it
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

Edit the number here and click on 'Update' Button

Step Six: Add Support (Pink Box)

1. Click on the point at which you want to add load on.
2. Then in the **pink box**, select one of the five supports by clicking on it.
(The leftmost is pinned support. The rest four are roller supports to different directions.)
3. Click "Add/Update" Button

Coordinates: 29.840, -6.300 (unit: in)

250x 2 in

I clicked on Point 3

2000 lb

Use this box for adding support

Press this button after selecting a support

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Truss Analysis App

Draw the Truss (Multi-line)
(Click to start)

Input Data Display:
Joint Input Member Properties

Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160, 18.420)
2	(47.520, 19.060)
3	(34.800, 5.140)

Joint Coordinates
X = 34.80
Y = 5.140
Update

Load
Now choose the direction of load:
→ ← ↑ ↓
Add Load

Support
Choose the support type or no support(X):
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

To edit existing support:

1. Click on the support you want to change
2. In the pink box, click on a different one and then click "Add/Update"
3. Or click "delete" if you want to delete it

(Click to start)

I clicked on the support at Point 3

2000 lb

I can either select a different support and update

Or just delete the support

Truss Analysis App

Draw the Truss (Multi-line)
(Click to start)

Input Data Display:
Joint Input Member Properties

Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160, 18.420)
2	(47.520, 19.060)
3	(34.800, 5.140)

Joint Coordinates
X =
Y =
Update

Load
Now choose the direction of load:
→ ← ↑ ↓
Add Load

Support
Choose the support type or no support(X):
Add/Update Delete Support

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

Step Seven: Add Member Properties (Brown Box)

Cross-Sectional Area:

1. If all members have the same cross-sectional area, type the number into $A = \underline{\hspace{1cm}}$ in the brown box and click "Apply to All."
2. If not, follow the steps below:
 - 1) **Click on members** you want to add properties to (*Important Note:* Move the cursor close enough to the member **that the member is thickened and then click**. The click won't work if the member is not thickened.)
 - 2) **To unselect all lines**, click on white space.
 - 3) **To unselect a specific line**, click on it again
 - 4) Type in cross-section area(A) for selected members and click "Apply."
 - 5) Keep selecting and applying until all members' cross-section area is defined.

Modulus of Elasticity:

1. If all members have the same modulus of elasticity, type the number into $E = \underline{\hspace{1cm}}$ in the brown box and click "Apply to All."
2. If not, follow the same step as entering the cross-sectional area above.

Coordinates: 23.040, 26.020 (unit: in)

25px 2 in

I clicked on the member at the top

See it is thicker than the other two

2000 lb

Then I put in the cross-sectional area and "Apply"

Truss Analysis App

Draw the Truss(Multi-line)
(Click to start)

Input Data Display:
Joint Input Member Properties

Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Node	Coordinates
1	(22.160,18.420)
2	(47.520,19.060)
3	(34.800,5.140)

Joint Coordinates
X =
Y =
Update

Load
Select a joint to add load
Or click on a load to change it
→ ← ↑ ↓
Add Load

Support
Select a joint to add support
Or click on a support to change it
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = 1.26 in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

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For members of the same cross-sectional area, they will be colored in a same color.

For same modulus of elasticity, nothing will happen, since all members usually have same E_s .

If you want to **see what you entered for member properties**, see Step Eight on the **next page**.

Step Eight: Edit Member Properties

To keep track:

1. To keep track of the cross-sectional areas and modulus of elasticity for the members, there is a great tool in the **Blue Box**.
2. In Input Data Display section (**the top of the box**), click on “**Member Properties.**”
3. Now, the blue box will keep displaying the properties of the members you entered.
4. To get the joint coordinates display back, click on “Joint Input” (the **first button** in the blue box).
5. To quit displaying, click on the “Stop Displaying” Button (the **last button** in the blue box).

To Edit:

Simply reenter the member properties in the **Brown Box**. The new values will cover the old ones.

Coordinates: 56.800, 28.660 (unit: in)

Truss Analysis App

I have added cross-sectional areas and Es for all members and clicked on “Member Properties” button

Member numbers
Correspond to the blue squares

Then a table displays the cross-sectional area(A) and modulus of elasticity(E) for all members

Input Data Display:
Joint Input Member Properties
Results Display:
Show Barforce Show Stress
Show Reaction Displacement
Stop Displaying

Nodes	A	E
1, 2	1.26	1000000
3, 2	2.1	1000000
1, 3	2.1	1000000

Joint Coordinates
X =
Y =
Update

Load
Select a joint to add load
Or click on a load to change it
→ ← ↑ ↓
Add Load lb

Support
Select a joint to add support
Or click on a support to change it
Add/Update

Cross-Section Area & Modulus of Elasticity
Select a member(s) to start
A = in² Apply Apply to All
E = psi Apply Apply to All

Save Progress Save to file
Erase Drawing Clean the Board
Open Saved File
Choose File No file chosen Resume Work

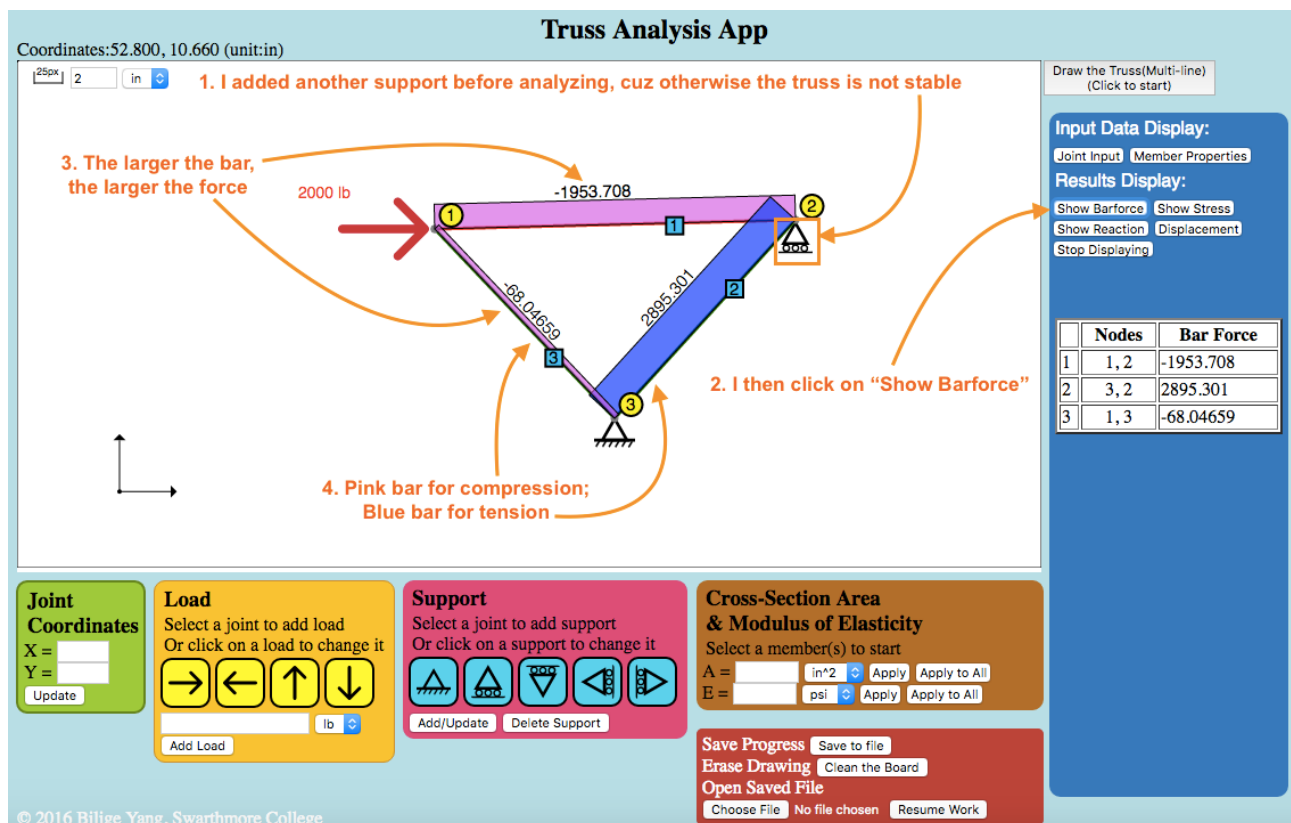
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Step Nine: The Results!

After entering the truss geometry, load, support, and member properties, the results can now be calculated. Simply click on the buttons in the “Results Display” section in the **Blue box**. Results will be shown both visually on the truss and in a table in the blue box.

For bar force and bar stress:

1. The larger the bar is the larger the force/stress is.
2. **Blue bar** means the member is in **tension**; **pink bar** means in **compression**.
3. The number above the bar is the corresponding force/stress.
(Negative number for compression; positive number for tension).



For Reaction:

1. Green arrows with number near the support shows the magnitude and direction of reaction.
2. Reaction results will not be shown in a table but only on the graph

For displacement:

1. The light blue line is the exaggerated deformed truss
2. The table in the blue box shows the displacement of each joint in inches.

Step Ten: Save and Retrieve Progress (Red Box)

You can save unfinished or finished truss design into a local file.

Save:

1. Click on "Save to file" Button in the **Red box**.
2. A window will pump out for you to select the folder and name for the file

Retrieve:

1. Click on "Choose File" in the Red box.
2. Choose the file you saved earlier
3. Click on "Resume Work"

Erase Current Drawing:

Click on "Clean the Board" in the Red box.