

App Inventor

Screens: Screen1 + - ⚙️ 🌐 Designer Blocks



```

when lineOfBestFitButton .Click
do open another screen screenName drawLOBFscreen

when cleanDataButton .Click
do open another screen screenName cleanDataScreen

when makePredictionsButton .Click
do open another screen screenName makePredictionsScreen

```

template

Screens: cleanDataScreen + - ⚙️ 🌐 Designer Blocks



```

when homeButton .Click
do open another screen screenName Screen1

when showDataButton .Click
do call cleanedChartData2D .Clear
call dataCleaningChartData2D .Clear
call spreadsheet1 .ReadSheet
sheetName "Spirit Lake"

when spreadsheet1 .GotSheetData
sheetData
do set topChartLabel .Text to "Spirit Lake, Orleans, Iowa"
call cleanedChartData2D .ImportFromSpreadsheet
spreadsheet spreadsheet1
xColumn "Year"
yColumn "Ice"
useHeaders true
call dataCleaningChartData2D .ImportFromSpreadsheet
spreadsheet spreadsheet1
xColumn "Year"
yColumn "Ice"
useHeaders true

when drawLineOfBestFitButton .Click
set Trendline1 .ChartData to cleanedChartData2D

when detectAnomaliesButton .Click
do call dataCleaningChartData2D .HighlightDataPoints
dataPoints | call AnomalyDetection1 .DetectAnomaliesInChartData
chartData dataCleaningChartData2D
threshold 2
color red

when dataCleaningChartData2D .EntryClick
x y
do if is in list? thing | make a list get x
get y
list | call AnomalyDetection1 .DetectAnomaliesInChartData
chartData dataCleaningChartData2D
threshold 2
then call dataCleaningChartData2D .RemoveEntry
x get x
y get y
call CleanedChartData2D .Clear
call CleanedChartData2D .ImportFromList
list | call DataCleaningChartData2D .GetAllEntries

when Trendline1 .Updated
results
do set topSlopeValueLabel .Text to Trendline1 .LinearCoefficient
set topY_intValueLabel .Text to Trendline1 .YIntercept
set topCor_coefValueLabel .Text to Trendline1 .CorrelationCoefficient

```

template

Screens: drawLOBFscreen + - ⚙️ 🌐 Designer Blocks



```

when homeButton .Click
do open another screen screenName Screen1

when showDataButton .Click
do call topChartData2D .Clear
call bottomChartData2D .Clear
call spreadsheet1 .ReadSheet
sheetName "Spirit Lake"

when spreadsheet1 .GotSheetData
sheetData
do set topChartLabel .Text to "Spirit Lake, Orleans, Iowa"
call topChartData2D .ImportFromSpreadsheet
spreadsheet spreadsheet1
xColumn "Year"
yColumn "Ice"
useHeaders true
call bottomChartData2D .ImportFromSpreadsheet
spreadsheet spreadsheet1
xColumn "Year"
yColumn "Temp"
useHeaders true

when drawLineOfBestFitButton .Click
do set topTrendline .ChartData to topChartData2D
set bottomTrendline .ChartData to bottomChartData2D
set topSlopeValueLabel .Text to topTrendline .LinearCoefficient
set topY_intValueLabel .Text to topTrendline .YIntercept
set topCor_coefValueLabel .Text to topTrendline .CorrelationCoefficient
set bottomSlopeValueLabel .Text to bottomTrendline .LinearCoefficient
set bottomY_intValueLabel .Text to bottomTrendline .YIntercept
set bottomCor_coefValueLabel .Text to bottomTrendline .CorrelationCoefficient

```

Scratch interface showing the code for the "makePredictionsScreen". The code includes logic for opening another screen, cleaning data, reading from a spreadsheet, displaying a chart, and interacting with a chatbot for AI analysis.

```

when [HomeButton v] Click
do [open another screen : screenName <--> Screen1]
when [ShowDataButton v] Click
do [call dataCleaningChartData2D -> Clear]
[call dataCleaningChartData2D -> ImportFromList]
[call spreadsheet1 -> ReadSheet]
[set dataCleaningChart -> Visible to true]
[set dataCleaningHorizontalArrangement -> Visible to true]
[set AIResponseHorizontalArrangement -> Visible to false]

when [spreadsheet1 v] GotSheetData
do [set topChartLabel Text to "Spirit Lake, Orleans, Iowa"]
[call cleanedChartData2D -> ImportFromSpreadsheet]
[spreadsheet1 -> spreadsheet1]
[xColumn -> Year]
[yColumn -> ice]
[useHeaders -> true]
[call dataCleaningChartData2D -> ImportFromSpreadsheet]
[spreadsheet1 -> spreadsheet1]
[xColumn -> Year]
[yColumn -> ice]
[useHeaders -> true]

when [drawLineOfBestFitButton v] Click
do [set trendline1 -> ChartData to cleanedChartData2D]

when Trendline1 is Updated
results
do [set SlopeLabel Label Text to round (Trendline1 LinearCoefficient)]
[set Y_interceptLabel Text to round (Trendline1 Yintercept)]
[set CorrelationCoefficientLabel Text to round (Trendline1 CorrelationCoefficient)]
[set X_interceptLabel Text to round (Trendline1 Xintercept)]
[call cleanedDataChart -> ExtendDomainToLabels]
[Trendline1 -> Xintercept]

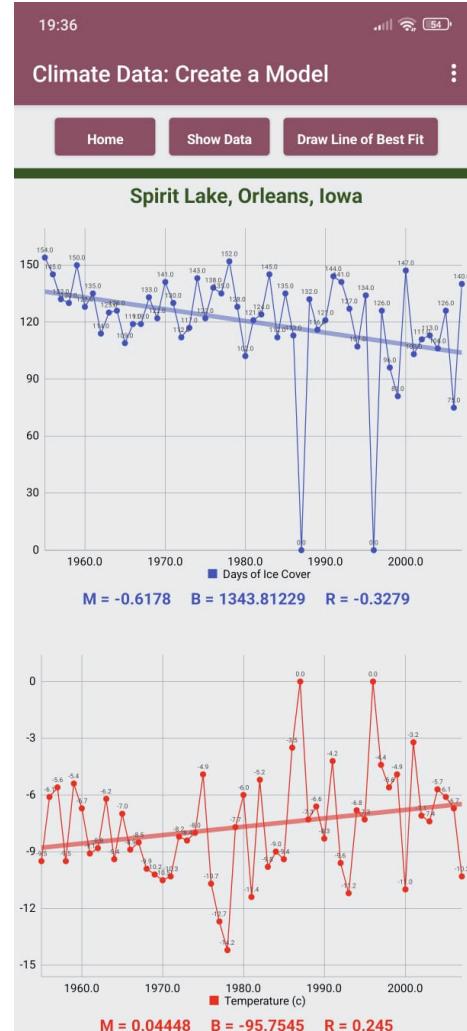
when [dataCleaningChartData2D v] EntryClick
do [call dataCleaningChartData2D -> RemoveEntry]
[x -> get x]
[y -> get y]
[call cleanedChartData2D -> Clear]
[call cleanedChartData2D -> ImportFromList]
[list1 call dataCleaningChartData2D -> GetAllEntries]

when [AIAnalysisButton v] Click
do [set dataCleaningChart -> Visible to false]
[set dataCleaningHorizontalArrangement -> Visible to false]
[set AIResponseHorizontalArrangement -> Visible to true]
[call ChatBot1 -> converse]
question
join ["Given the following data for the annual ", "number of days a freshwater lake was frozen: "]
call cleanedChartData2D -> GetAllEntries
["The correlation coefficient for the line of best fit is: "]
[Trendline1 -> CorrelationCoefficient]
["The slope of the line of best fit is: "]
[Trendline1 -> LinearCoefficient]
["The y-intercept for the line of best fit is: "]
[Trendline1 -> Yintercept]
["First, predict the year there will likely be no ice cover on the lake. Show your work and all steps. Next, what are the implications of this data for climate change?"]
["Limit your response to 120 words."]

when [ChatBot1 v] GoResponse
responseText
do [set AIResponseTextBox Text to get responseText]

when [dataCleanNonButton v] Click
do [call dataCleaningChartData2D -> HighlightDataPoints]
[dataPoints call AnomalyDetection1 -> DetectedAnomaliesInChartData]
[chartData call dataCleaningChartData2D -> threshold]
color

```



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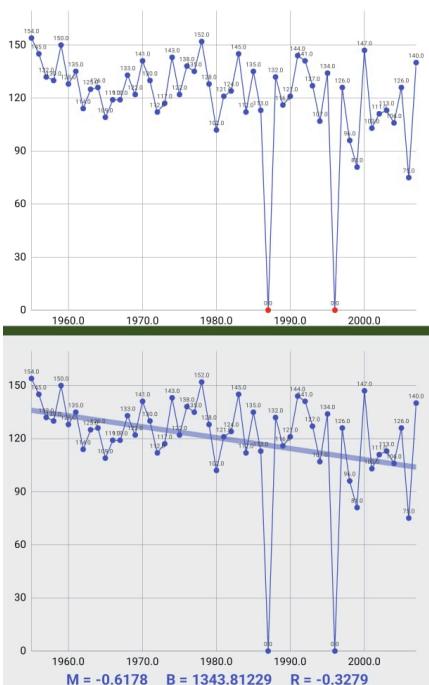
Climate Data: Cleaning the Data

[Home](#) [Show Data](#)

[Detect Anomalies](#) [Draw Line of Best Fit](#)

Spirit Lake, Orleans, Iowa

Data Cleaning: Click on anomalies in this window to remove.



19:36

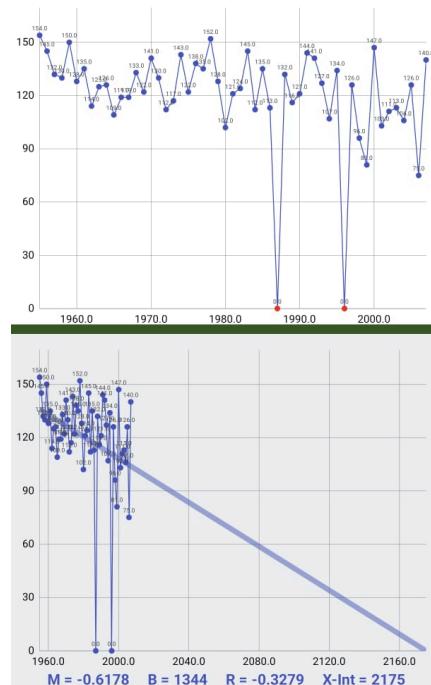
Climate Data: Making Predictions

[Home](#) [Show Data](#)

[Detect Anomalies](#) [Draw LOBF](#) [AI Analysis](#)

Spirit Lake, Orleans, Iowa

Data Cleaning: Click on anomalies in this window to remove.



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Climate Data: Making Predictions

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[Detect Anomalies](#) [Draw LOBF](#) [AI Analysis](#)

Spirit Lake, Orleans, Iowa

Prediction for No Ice Cover

Step 1: Write the line of best fit equation:
 $y = mx + b$
 $y = -0.6178x + 1343.8123$

Step 2: Set $y = 0$ (no ice cover days) and solve for x (year):
 $0 = -0.6178x + 1343.8123$

Step 3: Add $0.6178x$ to both sides:
 $0.6178x = 1343.8123$

Step 4: Divide both sides by 0.6178 :
 $x = 1343.8123 / 0.6178$
 $x = 2175.4$

Answer: The lake will likely have no ice cover approximately in the year 2175.*



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Climate Data: Making Predictions

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Spirit Lake, Orleans, Iowa

Answer: The lake will likely have no ice cover around the year 2175.**

Climate Change Implications

This 53-year dataset demonstrates a declining trend in lake ice duration, decreasing approximately 0.6 days annually. While the weak correlation (-0.33) suggests natural variability remains significant, the overall pattern indicates regional warming. Concerningly, recent decades show more extreme lows (75-96 days) compared to the 1950s-1970s (typically 109-154 days). The anomalous zero values (1987, 1996) warrant data verification but may reflect measurement gaps. Reduced ice cover disrupts aquatic ecosystems, affects winter recreation, alters evaporation rates, and serves as a sensitive climate indicator, corroborating broader evidence of anthropogenic climate change impacting freshwater systems.

