**Code Breakdown: Advanced Z-Score Analysis Indicator**

This script, named "Advanced Z-Score Analysis," calculates and displays the Z-Score of a security's price data, along with key statistical information such as the mean and standard deviation. It visualizes this information on a chart and provides a table summarizing Z-Scores and their associated probabilities. The indicator helps traders understand how far current prices deviate from their average values, offering insights into potential overbought or oversold conditions.

**1. Indicator Declaration and Input Tooltips**

pinescript

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//@version=5

//@Yaseen Khalil

indicator("Advanced Z-Score Analysis", overlay=false)

// Tooltips for user inputs

tt\_zLength = "Sets the length of the Z-Score assessment. Default is 75 periods."

tt\_smaLength = "Sets the SMA length for the display. Default is 75, adjust for responsiveness."

tt\_showTable = "Toggle to display the Z-Table summarizing probabilities."

* **indicator("Advanced Z-Score Analysis", overlay=false)**: Initializes the script as a standalone indicator (not overlayed on the main price chart).
* **Tooltips**: Provide descriptions for user inputs, guiding users on what each setting does.

**2. User Inputs**

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zLength = input.int(75, title="Z-Score Lookback Length", tooltip=tt\_zLength)

smaLength = input.int(75, title="SMA Length", tooltip=tt\_smaLength)

showTable = input.bool(true, title="Display Z-Table", tooltip=tt\_showTable)

* **zLength**: Sets the number of periods used to calculate the Z-Score. A higher value uses more data to smooth out the Z-Score calculation.
* **smaLength**: Defines the length of the Simple Moving Average (SMA) used in the calculation. This value affects the responsiveness of the mean line displayed on the chart.
* **showTable**: A toggle that allows users to display or hide the Z-Score probability table.

**3. Z-Score and SMA Calculations**

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zScore = (close - ta.sma(close, zLength)) / ta.stdev(close, zLength)

meanLine = ta.sma(close, zLength)

stdDev = ta.stdev(close, zLength)

* **zScore**: The Z-Score is calculated as the difference between the closing price and its SMA, divided by the standard deviation. The Z-Score indicates how many standard deviations the current price is from the mean. A higher absolute Z-Score suggests a stronger deviation from the average price.
* **meanLine**: This is the SMA of the closing prices over the specified length, representing the average price.
* **stdDev**: The standard deviation measures the spread of prices around the mean, indicating how much the prices vary.

**4. Reflect Z-Score as a Price Level**

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reflectedZScore = meanLine + (zScore \* stdDev)

* **reflectedZScore**: Converts the Z-Score back into a price level. It shows where the current price stands compared to the mean, adjusted by the Z-Score's magnitude.

**5. Plotting the Z-Score and Mean Lines**

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plot(reflectedZScore, "Reflected Z-Score Line", color=color.blue, linewidth=2, style=plot.style\_circles)

plot(meanLine, "Mean Line", color=color.red, linewidth=2)

* **plot(reflectedZScore...)**: Draws the Z-Score as a price level on the chart with blue circles, making it easy to see how far the price is from the average.
* **plot(meanLine...)**: Plots the mean line in red, showing the average price over the selected period.

**6. Label Management**

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var label zLabel = na

var label meanLabel = na

if bar\_index == ta.highest(bar\_index, 1)

label.delete(zLabel)

label.delete(meanLabel)

zLabel := label.new(bar\_index, reflectedZScore, text="Z-Score: " + str.tostring(zScore, "#.##") + "\nPrice: " + str.tostring(reflectedZScore, "#.##"), size=size.small, color=#2195f30c, textcolor=color.white, style=label.style\_label\_left)

meanLabel := label.new(bar\_index, meanLine, text="Mean: " + str.tostring(meanLine, "#.##"), size=size.small, color=color.rgb(255, 82, 82, 95), textcolor=color.white, style=label.style\_label\_left)

* **label.delete(zLabel)** and **label.delete(meanLabel)**: Remove previous labels to avoid cluttering the chart.
* **label.new**: Creates new labels showing the current Z-Score value and mean price. These labels help users see the latest statistical information at a glance.

**7. Z-Table Display**

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bgColor = color.black

textColor = color.white

var table zTable = table.new(position.bottom\_center, 8, 3, border\_color=color.gray, bgcolor=bgColor)

* **table.new(...)**: Creates a table at the bottom center of the chart. This table is used to display Z-Score ranges and their associated probabilities.

**8. Displaying Z-Score Probabilities**

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if showTable

currentProb = zScore < -3 ? "0.0013" : zScore < -2 ? "0.0228" : zScore < -1 ? "0.1600" : zScore < 0 ? "0.5000" : zScore < 1 ? "0.8500" : zScore < 2 ? "0.9800" : "0.9998"

// Z-Score labels and colors

table.cell(zTable, 0, 0, text="Z-Score", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 1, 0, text="-3", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 2, 0, text="-2", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 3, 0, text="-1", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 4, 0, text="0", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 5, 0, text="1", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 6, 0, text="2", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 7, 0, text="3", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

// Probability values and current probability

table.cell(zTable, 0, 1, text="Probability", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 1, 1, text="0.0013", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 2, 1, text="0.0228", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 3, 1, text="0.1600", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 4, 1, text="0.5000", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 5, 1, text="0.8500", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 6, 1, text="0.9800", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

table.cell(zTable, 7, 1, text="0.9998", text\_size=size.small, bgcolor=bgColor, text\_color=textColor)

// Highlight the current Z-Score probability

table.cell(zTable, 0, 2, text="Current Prob", text\_size=size.small, bgcolor=bgColor, text\_color=color.yellow)

table.cell(zTable, 4, 2, text=currentProb, text\_size=size.small, bgcolor=bgColor, text\_color=color.yellow)

* **Purpose**: Displays a table that summarizes different Z-Scores and their corresponding probabilities. The current Z-Score’s probability is highlighted, helping users quickly assess the likelihood of a price being this far from the average.