# SSVE White Balance Data Visualization

20 Dec 2021, SSVE started a trial which is an activity to write White Balance data into Pmod T-Con board.

To ensure effectiveness, PE wanna check log data compared with JND.

This small VBA project helps to accelerate the whole process.

## Author

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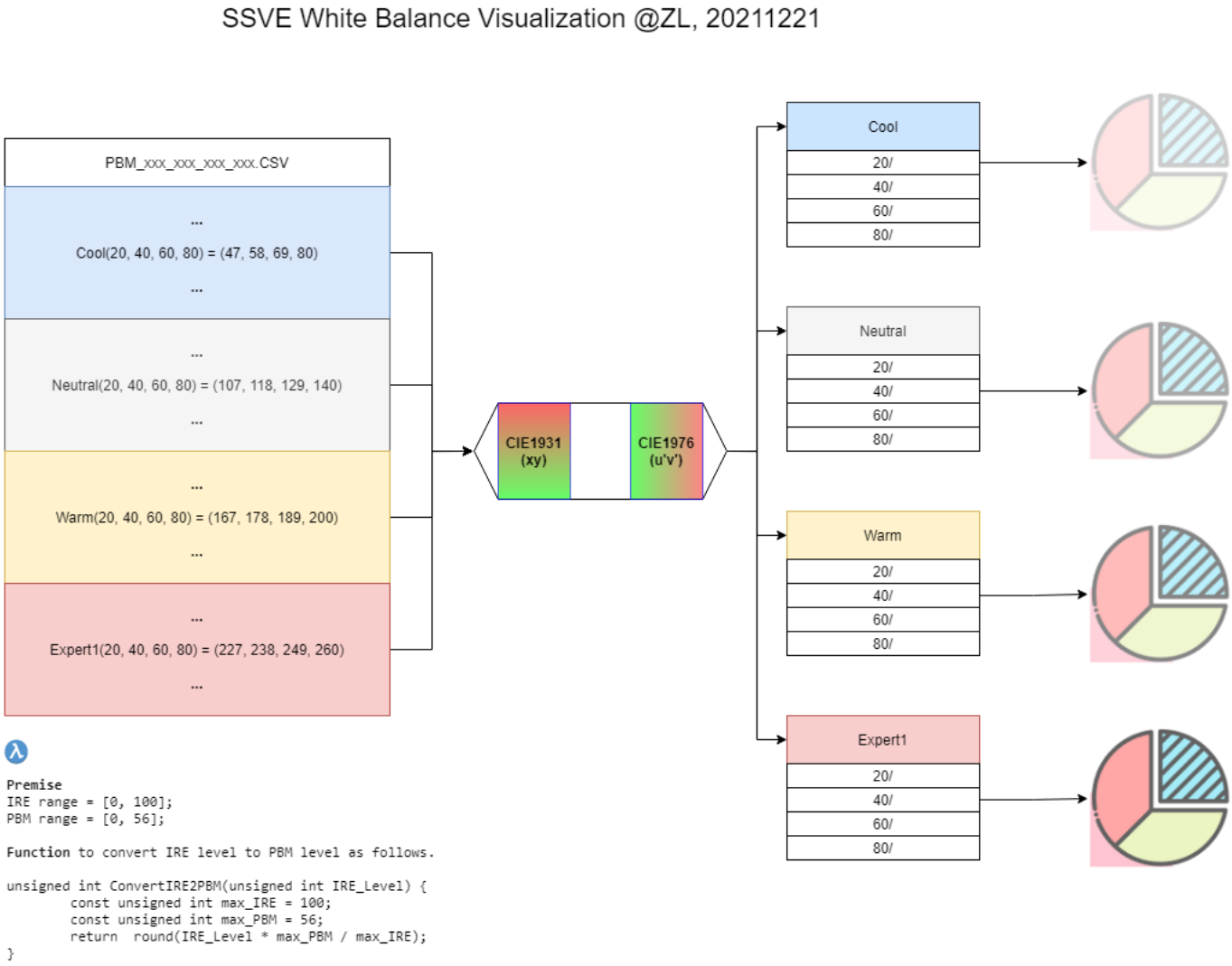
## Changelog

- v0.01, initial build
- v0.02, fix visualization bug (screw non-standard charts..)
- v0.03, resize `named range` dynamically
- v0.04, create `Python3` + `Rlang` solution for scaling data and workload;

## Diagram

the following the diagram of the whole process




# Solution 01

toolkits: VB.NET + Excel + VBA;

using this approach when workload and dataset are small (<= 1,000);

## Implementation

some core functionality as follows.

```
Private Sub read_PBM_csv(ByVal csv_path As String, ByRef dstWB As Workbook)
    ''' read data from a PBM csv log files at SSVE @ZL, 20211220
    Const col_x As Integer = 5
    Const col_y As Integer = 6
    Const idx_x As Integer = 0
    Const idx_y As Integer = 1
    Const sheet_no As Integer = 1
    Dim cool, neutral, warm, expert1, color_temps

    cool = Array(47, 58, 69, 80)
```

```
    neutral = Array(107, 118, 129, 140)
    warm = Array(167, 178, 189, 200)
    expert1 = Array(227, 238, 249, 260)

    color_temps = Array(cool, neutral, warm, expert1)

    Dim src_wb As Workbook
    Dim src_ws As Worksheet

    Set src_wb = GetObject(csv_path)
    Set src_ws = src_wb.Worksheets(sheet_no)

    Dim i As Integer
    Const wsn_cool As String = "Cool"
    Const wsn_neutral As String = "Neutral"
    Const wsn_warm As String = "Warm"
    Const wsn_expert1 As String = "Expert1"
    Dim dstWS_cool As Worksheet: Set dstWS_cool = dstWB.Sheets(wsn_cool)
    Dim dstWS_neutral As Worksheet: Set dstWS_neutral = dstWB.Sheets(wsn_neutral)
    Dim dstWS_warm As Worksheet: Set dstWS_warm = dstWB.Sheets(wsn_warm)
    Dim dstWS_expert1 As Worksheet: Set dstWS_expert1 = dstWB.Sheets(wsn_expert1)

    Const lb As Integer = 0
    Const ub As Integer = 3
    Dim dstRow As Integer
    Const dstCol_dt As Integer = 2
    Const dstCol_ser As Integer = 3
    Const dstCol_u As Integer = 7
    Const dstCol_v As Integer = 8

    For i = lb To ub
        dstRow = GetLastRow(dstWS_cool, dstCol_u) + 1
        dstWS_cool.Cells(dstRow, dstCol_ser).Value = dstWS_cool.Cells(dstRow,
dstCol_ser).Value & parse_pbm_fp(csv_path)
        dstWS_cool.Cells(dstRow, dstCol_u).Resize(1, 2) =
ConvXY_to_uv(src_ws.Cells(cool(i), col_x), src_ws.Cells(cool(i), col_y))
' cool

        dstWS_neutral.Cells(dstRow, dstCol_ser).Value =
dstWS_neutral.Cells(dstRow, dstCol_ser).Value & parse_pbm_fp(csv_path)
        dstWS_neutral.Cells(dstRow, dstCol_u).Resize(1, 2) =
ConvXY_to_uv(src_ws.Cells(neutral(i), col_x), src_ws.Cells(neutral(i), col_y))
' neutral

        dstWS_warm.Cells(dstRow, dstCol_ser).Value = dstWS_warm.Cells(dstRow,
dstCol_ser).Value & parse_pbm_fp(csv_path)
        dstWS_warm.Cells(dstRow, dstCol_u).Resize(1, 2) =
ConvXY_to_uv(src_ws.Cells(warm(i), col_x), src_ws.Cells(warm(i), col_y))
' warm

        dstWS_expert1.Cells(dstRow, dstCol_ser).Value =
dstWS_expert1.Cells(dstRow, dstCol_ser).Value & parse_pbm_fp(csv_path)
        dstWS_expert1.Cells(dstRow, dstCol_u).Resize(1, 2) =
ConvXY_to_uv(src_ws.Cells(expert1(i), col_x), src_ws.Cells(expert1(i), col_y))  '
```

```
expert1
    Next i

    src_wb.Close False
    Set src_wb = Nothing
End Sub
```

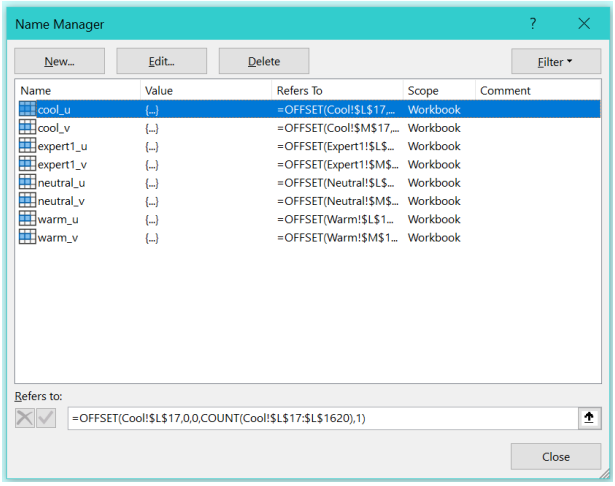
# Visualization

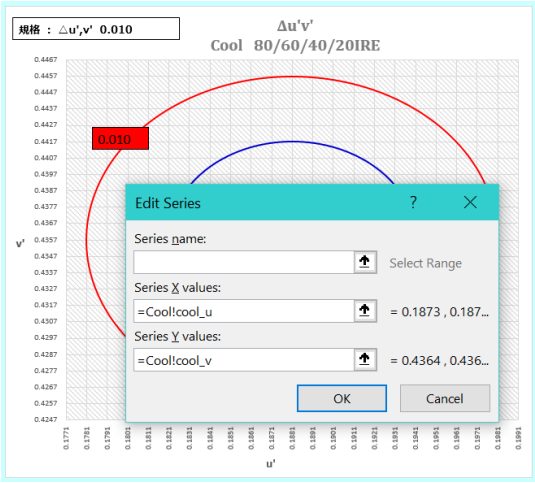
using some tricks to make dynamic charts.

## Dynamic Chart

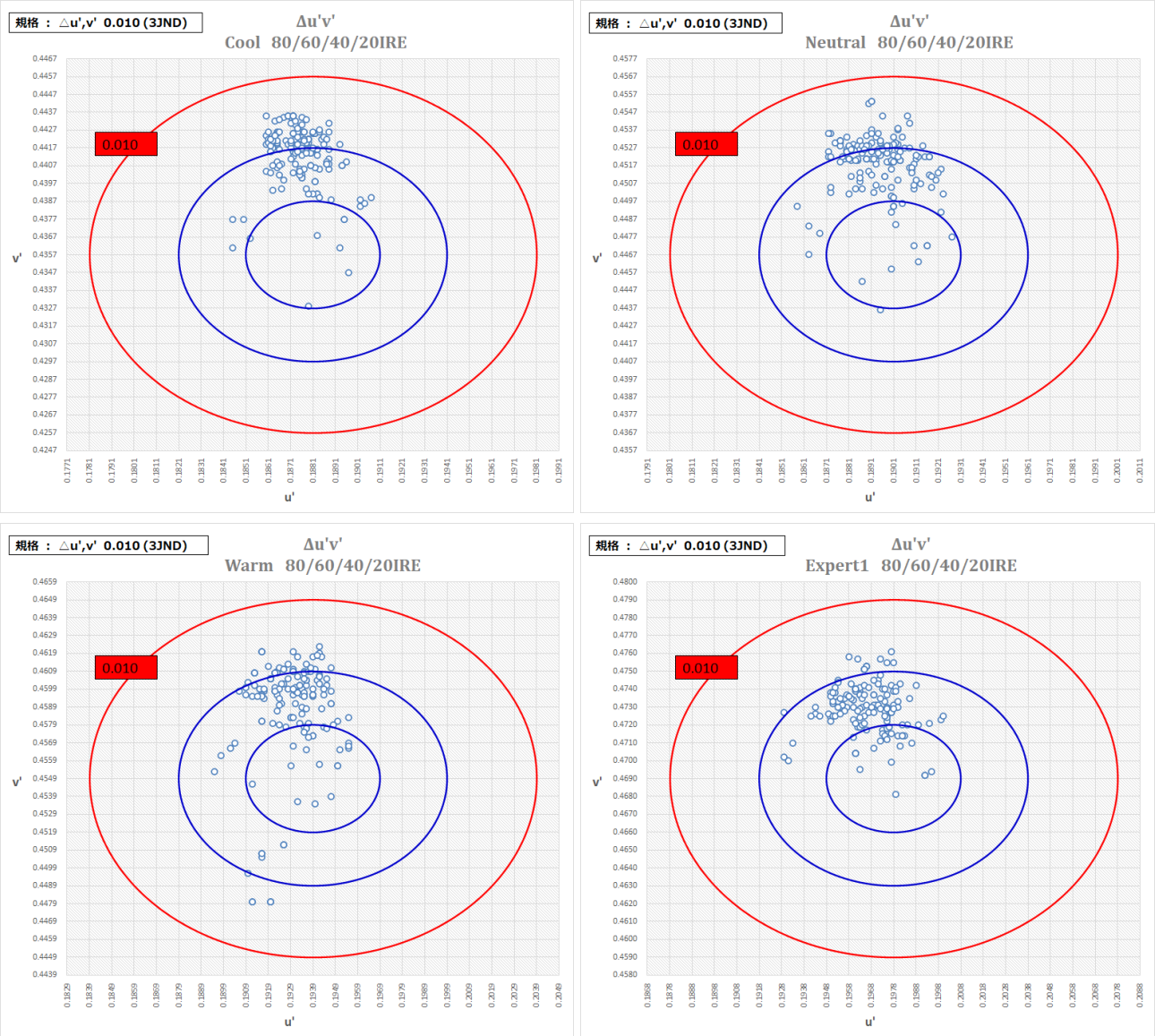
```
''' Dynamic Chart
' [ trick ]
' step1: using Formula -> Define Name to cusomize target series + offset()
function
' step2: using Click Chart -> select data series -> target series

' ref: https://support.microsoft.com/en-us/office/offset-function-c8de19ae-dd79-
4b9b-a14e-b4d906d11b66
' syntax: OFFSET(reference, rows, cols, [height], [width])
```




## Gallary




# Solution 02

toolkits: Python3 + Pandas + Rlang + ggplot2;

using this approach when workload and dataset are enormous (>=1,000);

## Implementation

```
class PBM_Wrangler:
    fn_prefix:str         = 'PBM_'
    fn_ext:str            = 'CSV'
    head_x:str            = 'x(calc)'
    head_y:str            = 'y(calc)'
    head_xy:List[str]     = [head_x, head_y]
    head_picmode:str      = 'picmode'
    head_level:str        = 'LEVEL'
    head_u:str            = 'u'
    head_v:str            = 'v'
```

```
    head_uv:List[str]     = [head_u, head_v]
    dummy_rows:List[int]  = [i for i in range(33)] + [92, 93] + [152, 153] + [212,
213] + [272, 273] # may change overtime..
    levels:int            = 57
    temps:List[str]       = ['COOL'] * levels + ['NEUTRAL'] * levels + ['WARM'] *
levels + ['EXPERT1'] * levels + ['PHOTO'] * levels
    ires:List[int]        = [12, 23, 34, 45]
    color_temps:List[str] = ['COOL', 'NEUTRAL', 'WARM', 'EXPERT1']

    df_temp:DataFrame           = None
    df_cools:List[DataFrame]    = []
    df_neutrals:List[DataFrame] = []
    df_warms:List[DataFrame]    = []
    df_expert1s:List[DataFrame] = []
    df_cts:List[List[DataFrame]] = [df_cools, df_neutrals, df_warms, df_expert1s]
# note: match with color_temps

    def __init__(self, src_folder:Path) -> None:
        """initialize an instance with a given folder with source PBM_*.CSV log
files inside

        Args:
            src_folder (Path): a given folder with source PBM_*.CSV log files
inside
        """
        self._src_folder = src_folder

    def _filter(self)->Path:
        for path in sorted(pathlib.Path(self._src_folder).rglob(f'*.
{self.fn_ext}')):
            if path.name.startswith(self.fn_prefix):
                yield path.absolute()

    @staticmethod
    def xy2uv(x:float, y:float)->Tuple:
        u = (4 * x) / (12 * y - 2 * x + 3)
        v = (9 * y) / (12 * y - 2 * x + 3)
        return u, v

    def xy2u(self, x:float, y:float, offset:float=.0)->float:
        return (4 * x) / (12 * y - 2 * x + 3) + offset

    def xy2v(self, x:float, y:float, offset:float=.0)->float:
        return (9 * y) / (12 * y - 2 * x + 3) + offset

    def __read(self, pbm_file:Path)->None:
        df:DataFrame = pd.read_csv(pbm_file, skiprows=self.dummy_rows,
engine='python')
        df[self.head_picmode] = self.temps
        self.df_temp = df[np.isin(df[self.head_level], self.ires)]

    def __categorize(self, color_temp:str, dst_df:List[DataFrame])->None:
        df:DataFrame = self.df_temp[self.df_temp[self.head_picmode] ==
color_temp].loc[:, [self.head_x, self.head_y]]
```

```
        df[self.head_u] = df.apply(lambda df: self.xy2u(df[self.head_x],
df[self.head_y]), axis=1)
        df[self.head_v] = df.apply(lambda df: self.xy2v(df[self.head_x],
df[self.head_y]), axis=1)
        fixed_df = df.loc[:, self.head_uv]
        dst_df.append(fixed_df)

    def __reset(self, how:str=None)->None:
        self.df_temp = None
        if how == 'all':
            for df in self.df_cts:
                df.clear()

    def __wrangle(self)->None:
        for color_temp, df_ct in zip(self.color_temps, self.df_cts):
            if df_ct: self.__categorize(color_temp, df_ct)
        self.__reset()

    def __concat(self, color_temp:str, src_df:List[DataFrame])->None:
        df:DataFrame = pd.concat(src_df, ignore_index=True, sort=False)
        df.to_csv(f'./src/{color_temp}.csv', index=False)

    def __tocsv(self)->None:
        for color_temp, df_ct in zip(self.color_temps, self.df_cts):
            if df_ct: self.__concat(color_temp, df_ct)

    @timer
    def work(self)->None:
        logging.info('start working..')
        for pbm_file in self._filter():
            self.__read(pbm_file)
            self.__wrangle()
        self.__tocsv()
        self.__reset(how='all')
        logging.info('successed.')
```

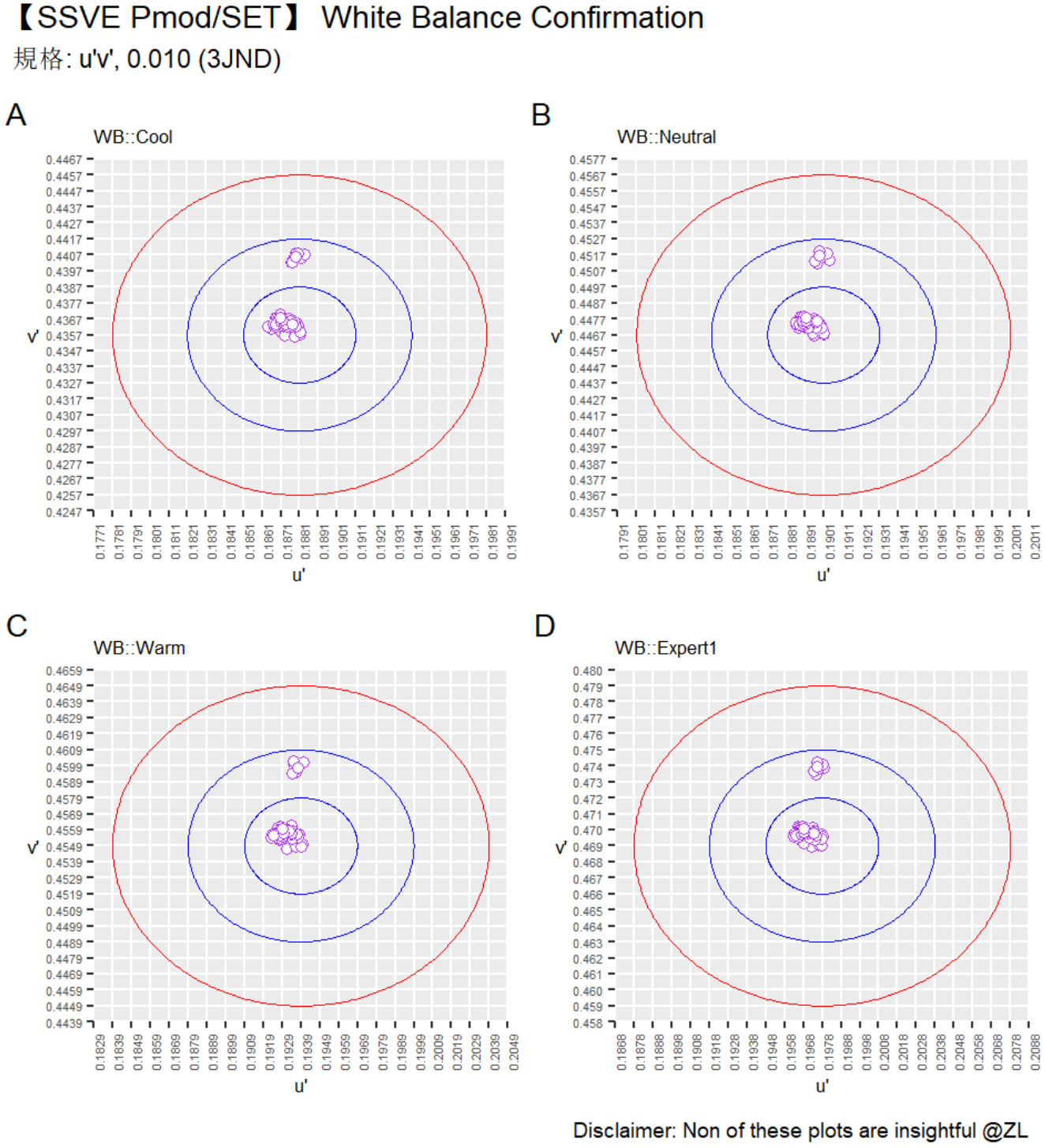
## Visualization

```
### plot
plot.wb <- function(df.temp, temp,
                    temp.breaks.x, temp.breaks.y,
                    temp.minor.x, temp.minor.y,
                    temp.jnd1, temp.jnd2, temp.jnd3) {

  p <- ggplot(df.temp) +
    geom_point(aes(x=u,
                   y=v),
               colour = "purple",
               shape = 21,
```

```
                fill = 'white',
                stroke = .5,
                alpha = 0.9,
                size = 2) +
    #  coord_cartesian(xlim=c(0.1771, 0.1991),
    #                  ylim=c(0.4247, 0.4467)) +
      scale_x_continuous(breaks = temp.breaks.x,
                         minor_breaks = temp.minor.x) +
      scale_y_continuous(breaks = temp.breaks.y,
                         minor_breaks = temp.minor.y) +
      labs(title=gsub(' ', '', paste('WB::', temp)),
           x="u\'",
           y="v\'") +
      theme(plot.title = element_text(size=8),
            #panel.grid.major.x = element_blank(),
            #panel.grid.major.y = element_blank(),
            panel.grid.minor.x = element_blank(),
            panel.grid.minor.y = element_blank(),
            axis.title.x = element_text(size=8),
            axis.title.y = element_text(angle=0, size=8, vjust=0.5),
            axis.text.x = element_text(angle=90, size=5),
            axis.text.y = element_text(size=5)) +
      geom_path(data=temp.jnd1,
                aes(x=du,
                    y=dv),
                size = 0.2,
                color = 'blue'
                ) +
      geom_path(data=temp.jnd2,
                aes(x=du,
                    y=dv),
                size = 0.2,
                color = 'blue'
      ) +
      geom_path(data=temp.jnd3,
                aes(x=du,
                    y=dv),
                size = 0.2,
                color = 'red'
      )
  #  dev.print(file = gsub(' ', '',paste('Rplot_', temp, '.png')),
  #            device = png,
  #            width = 800,
  #            height = 800)
    return(p)
  }
```

## Gallary




# About

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