Page 1: Model Performance Analysis
UI & Data Controls:

- **Title & Layout: The page is set up with a centered, wide layout. The left column contains controls and dropdowns while the right column displays the visualization and summary table.**
- **Controls:**
  - **NLP Approach Dropdown: Options include LDA, GPT, COMBINED, and LIWC.**
  - **Idiographic/Nomothetic Dropdown: Changes based on the NLP approach (for GPT, defaults to "Nomothetic" for data availability).**
  - **Outcome Dropdown: Selects the outcome (e.g., Negative Affect, Angry, Nervous, Sad). For GPT, outcome values are standardized (e.g., "negative affect" becomes "na") and filtered from the file.**

Graph Details:

- **Graph Type: Violin Plot**
- **Axes:**
  - **X-Axis: Represents the "ML Model." In GPT mode, it shows a single category ("GPT"), while in other cases it shows two categories: "Elastic Net (en)" and "Random Forest (rf)."**
  - **Y-Axis: Represents the R^2 values, showing the distribution of model performance.**
- **Data & Filtering:**
  - **GPT: Loads from modelfit_gpt_all.csv filtered by outcome and (if available) the nomothetic/idiographic value.**
  - **Non-GPT Models: Loads separate CSV files for Elastic Net and Random Forest; these datasets are concatenated.**
- **Colors:**
  - **GPT Mode: The violin is rendered in blue.**
  - **Non-GPT: Elastic Net is shown in red, and Random Forest is shown in blue. The colors help differentiate the model types and make it easier to visually compare their R^2 distributions.**
- **Additional Features: The violin plot includes boxplots and all data points are shown, offering insight into both central tendency and spread.**

Summary Table:

- **Content: A table summarizing key statistics per model including the mean (with standard deviation), count (N), range (min to max R^2), and the count of p-values below 0.05.**
- **Calculation: Each metric is computed on the filtered dataset and then presented in a neat tabular format.**

General Description:

This page shows an overall comparison of machine learning model performance using R^2 values. The user can select the NLP approach (LDA, GPT, LIWC, or COMBINED), choose between idiographic or nomothetic modeling, and specify an emotional outcome (e.g., Negative Affect, Angry, Nervous, Sad). The violin plot displays the distribution of R^2 values for each model (Elastic Net and Random Forest), giving a visual summary of predictive accuracy across all participants.

🧠 **Welcome to the Model Performance Analysis Dashboard!** Let me walk you through what you're seeing:

📊 What This Figure Shows

This graph displays how well two machine learning models — **Elastic Net (in red)** and **Random Forest (in blue)** — predict a chosen emotional outcome based on text data. The measure of model

performance is **R^2 (R-squared)**, which tells you how much variance in the outcome is explained by the model. Higher values mean better predictions.

The violin plots visualize the distribution of R^2 values across individuals or samples. Each dot represents one observation (e.g., a person or a time point), and the wider sections of the violin show where more R^2 values are concentrated.

🛠 What You Can Customize (on the Left Side)

You can tailor the graph by selecting from these dropdown menus:

1. **NLP Approach**
   Choose the text analysis method used to extract features from language:
   - `LIWC` – Linguistic Inquiry and Word Count (dictionary-based)
   - `LDA` – Topic modeling approach
   - `GPT` – Features extracted using a large language model
   - `COMBINED` – A combination of all above methods
2. **Idiographic/Nomothetic**
   Select the modeling framework:
   - `Idiographic` – Individual-level models tailored to each person
   - `Nomothetic` – Group-level models applied across all participants
3. **Outcome**
   Pick the emotional state you're predicting:
   - `Negative Affect` – A general negative emotion score
   - `Angry` – Feelings of anger
   - `Nervous` – Feelings of anxiety
   - `Sad` – Feelings of sadness

💡 **Try changing the selections to explore how different models and NLP approaches perform under various conditions!**

Page 2: Data Table View – Model Performance per Participant
UI & Data Controls:

- **Layout: The page uses a centered, wide layout with controls in the left column and a data table in the right column.**
- **Controls:**
  - **NLP Approach, Idiographic/Nomothetic, ML Model, and Outcome Dropdowns: These determine which CSV file is loaded. For GPT, the outcome is chosen from unique values in the file; otherwise, the outcome is standardized (e.g., "negative affect" to "na").**

Data Table:

- **Table Type: Interactive Data Table**
- **Displayed Columns: Typically includes id, participant, r, r2, rmse, and p_value.**
- **Purpose: Presents participant-level performance metrics from the selected file.**
- **Axes Explanation:**
  - **Unlike a graph, the table shows rows for each participant and columns for each metric.**
- **Color and Formatting:**

    - **No explicit colors are used in the table; however, column headers and data formatting help in quick reading.**
- **Interaction: The table is scrollable with a fixed height (600px) and width (1200px).**

General Description:

This page shows participant-level model performance metrics in table form. Users can filter by NLP approach, modeling type, machine learning model, and emotional outcome. For each participant, the table displays their correlation (r), R^2 value, RMSE, and p-value, helping users assess how well the model fits each individual. This view is useful for identifying individuals for whom the model performs particularly well or poorly.

📋 **Welcome to the Participant-Level Model Performance View!** Let me explain what you're seeing here:

🔍 What This Table Shows

This section displays detailed model performance **for each individual participant**, based on your current settings.

Each row corresponds to one participant, with the following columns:

- **`participant`**: Unique ID of the participant
- **`r`**: Correlation between predicted and actual values
- **`r²`**: Proportion of variance explained by the model (higher = better)
- **`rmse`**: Root Mean Square Error – lower values indicate better fit
- **`p_value`**: Statistical significance of the model (typically you'd want $p < .05$, but note that this is harder to achieve at the individual level)

This lets you dive into **how well the model performs for each person** — which is especially useful when using idiographic models!

🛠 What You Can Customize (on the Left Side)

You can use the dropdowns to control what's displayed in the table:

1. **NLP Approach**
   Choose the text analysis method:
    - `LIWC` – Dictionary-based features
    - `LDA` – Topic modeling
    - `GPT` – Large language model-based features
    - `COMBINED` – All methods combined
2. **Idiographic/Nomothetic**
   Choose modeling framework:

- `Idiographic` – Personalized, individual-level models
- `Nomothetic` – Group-level model applied across all participants

3. **ML Model**
   Choose the machine learning algorithm:
   - `Elastic Net (en)` – Linear model with regularization
   - `Random Forest (rf)` – Tree-based ensemble method
4. **Outcome**
   Choose which emotional outcome you want to predict:
   - `Negative Affect` – General negative emotion
   - `Angry`, `Nervous`, or `Sad` – Specific emotional states

💡 **Tip:** Use this view to identify which participants the model fits best — or where it struggles — and explore whether certain patterns (like NLP approach or model type) work better for specific individuals!

Page 3: True vs Predicted NA Levels
UI & Data Controls:

- **Title & Refresh: The title "True vs Predicted NA Levels" is displayed along with a "Clear All" button that resets the session state.**
- **Dynamic Graph Sections: The user can add multiple graph sections; each section has its own controls for outcome, ML model, and participant selection.**

Graph Details:

- **Graph Type: Line Chart**
- **Axes:**
  - **X-Axis: Represents time (the "time" column from the dataset).**
  - **Y-Axis: Represents NA levels; two lines are plotted—one for the actual (true) NA levels and one for the predicted estimates.**
- **Data & Filtering:**
  - **Data is loaded from a CSV file whose filename is constructed based on the selected ML model, outcome, and nomothetic/idiographic value.**
  - **After selecting a participant, the data is filtered to include only rows for that participant.**
- **Colors:**
  - **Actual NA Levels: Plotted in teal with a solid line.**
  - **Predicted NA Levels: Plotted in red using a dashed line.**
  - **Correlation Calculation: The correlation coefficient between the actual and predicted NA values is computed and displayed in the title.**
- **Additional Features:**
  - **The graph has fixed dimensions (900 px wide, 400 px high) to ensure consistency, and tooltips show detailed information when hovering.**

General Description:

This page shows a time series graph of actual vs. predicted emotion levels for a single participant. The user selects the participant ID, model type, NLP approach, modeling framework, and outcome variable. The plot shows how predicted values track actual reported levels over time. Users can click "Add Another Graph" to compare the same participant under different models or settings side-by-side.

📈 **You're Now Viewing a Time Series Graph for an Individual Participant!**
Let's walk through what you're seeing and how you can explore more:

🧪 What This Graph Shows

This line graph compares the **actual** and **predicted** levels of **Negative Affect (NA)** over time for a single participant.

- The **solid teal line** shows the participant's actual NA levels over time.
- The **dashed red line** shows the levels predicted by the model.
- At the top, you'll see the **participant ID** and their **correlation (R)** score, which tells you how well the model's predictions align with their real data (higher R = better prediction).

This view gives you a **fine-grained, idiographic snapshot** of how well the model tracks fluctuations in emotion for this person.

🛠️ What You Can Customize (on the Left Side)

You can change the graph using the dropdowns:

- **Outcome**: Choose which emotion you're analyzing (`Negative Affect`, `Angry`, `Nervous`, `Sad`)
- **Idiographic/Nomothetic**: Set the modeling framework (individual vs group model)
- **ML Model**: Pick the machine learning algorithm (`Elastic Net`, `Random Forest`, etc.)
- **Participant**: Select which participant's data to view

➕ **Want to Compare Models or Conditions?** Click **"Add Another Graph to Compare"** to plot a second graph **side-by-side**. This is especially useful if you want to:

- Compare the **same participant** under **different model settings**
- See how predictions change between **idiographic vs nomothetic** modeling
- Try different **NLP approaches** or **outcomes**

💡 **Pro tip:** Look for moments where the red and teal lines diverge or align — it can tell you a lot about model accuracy and when predictions break down.

Page 4: Best Model Performance per Participant
UI & Data Controls:

- **Layout: The page features controls on the left (including checkboxes and dropdowns) and a results section on the right.**

- **Controls:**
    - **Checkbox: "Include both Elastic Net and Random Forest" – when checked, both models are compared; when unchecked, a dropdown allows selection of one model.**
    - **Outcome Dropdown: Allows selection of an outcome (e.g., Negative Affect, Angry, Nervous, Sad).**

Data Processing:

- **Aggregation: Data from multiple CSV files (covering different NLP approaches and both idiographic and nomothetic cases) are merged and filtered.**
- **Selection: For each participant, the record with the highest R^2 is selected.**

Displayed Elements:

- **Data Table:**
    - **Content: Shows the best performance for each participant, including Participant, ML Model (if both are included), Nomothetic/Idiographic, NLP Approach, R^2, RMSE, P Value, and Counts.**
- **Pie Charts:**
    - **Graph Types: Pie Charts**
    - **Pie Chart 1 (Nomothetic vs. Idiographic):**
        - **Slices: Represent counts of participants per category.**

Colors: Use Plotly's default discrete colors to differentiate the groups.

- **Pie Chart 2 (NLP Approaches):**
  - **Slices: Represent the frequency of each NLP approach; "comb" is re-labeled as "All text features combined."**
  - **Colors: Also use discrete color mapping.**
- **Pie Chart 3 (ML Models):**
  - **Shown only if both models are included.**
  - **Slices: Represent the counts for Elastic Net and Random Forest.**
  - **Colors: Defined via a discrete map (Elastic Net in red, Random Forest in blue).**

- **Axes Explanation for Pie Charts:**
  - **Pie charts do not have traditional axes; the slices' sizes represent proportions or counts.**
- **Legend & Layout:**
  - **The charts are arranged in columns with legends and centered titles for clarity.**

🏆 Best Model Performance Page

Page ID / Tag: `best_model_performance`

Description:

This page ranks participants based on their best observed model performance. It displays a sortable and searchable table showing **which combinations of modeling approach, NLP method, and machine learning algorithm produced the best results for each participant**.

The table includes:

- **Participant ID**
- **Modeling type** (Idiographic, Nomothetic, or LLM Ratings)
- **NLP Approach** (LIWC, LDA, GPT, or Combined)
- **R^2** – how much variance in emotion is explained
- **RMSE** – prediction error
- **P-value** – model significance
- **Counts** – number of time points used

🛠️ Controls (on the left)

Users can customize the table view by selecting:

- ✅ Whether to include results from **both Elastic Net and Random Forest**, or filter by one model
- 📊 **ML Model** (Elastic Net or Random Forest)
- 🎯 **Outcome variable** (Negative Affect, Angry, Nervous, Sad)

These three pie charts summarize which modeling settings were most frequently associated with **the best-performing models across participants**. The charts categorize the top models based on:

1. **Modeling Framework** – Idiographic vs. Nomothetic vs. LLM-only (no ratings)
2. **NLP Approach** – LIWC, LDA, GPT, or All Text Features Combined
3. **ML Algorithm** – Elastic Net vs. Random Forest vs. LLM/GPT-only models

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Page 5: Feature Importance Heatmap (SHAP Values)
UI & Data Controls:

- **Layout: The page uses a two-column layout with controls in the right column and the heatmap visualization in the left column.**
- **Controls:**
  - **Outcome and Model Dropdowns: Users select the outcome (e.g., Negative Affect, Angry, etc.) and the ML model (Elastic Net (EN) or Random Forest (RF)).**
  - **Participant Multi-select: Allows selection of specific participants, or an "All" option can select every participant.**
  - **Dynamic Symmetric Slider: A slider allows users to set a symmetric threshold for feature importance values. The slider is linked to a callback that forces the two handles to be opposites (e.g., if one is set to –0.005, the other becomes 0.005).**
  - **Info Box: A message box below the slider explains which SHAP importance values will be included (those outside the threshold) and which will be filtered out.**

Graph Details:

- **Graph Type: Heatmap**
- **Axes:**
  - **X-Axis: Represents the selected participants. When "All" is chosen, the x-axis shows a single label ("All Participants"); otherwise, it shows individual participant names.**
  - **Y-Axis: Represents the features (variables) that passed the importance threshold.**
- **Data Processing:**
  - **Data is loaded from a CSV (named by model and outcome). After grouping and averaging, the data is pivoted so that features form the rows and participants the columns.**
  - **The pivoted data is filtered based on the importance threshold.**
- **Colors:**
  - **Color Scale: A custom color scale is used:**
    - **Deep Blue represents strong negative SHAP values.**
    - **White represents neutral importance.**
    - **Deep Red represents strong positive SHAP values.**
  - **Feature Label Colors: Each feature label on the y-axis is colored according to its NLP method (using a predefined color map such as LIWC in red, GPT in blue, etc.).**
- **Layout Adjustments:**
  - **The heatmap's height and width are dynamically set based on the number of features and participants.**
  - **A legend below the graph (built using HTML) explains the color mapping for the NLP methods.**

🔍 Feature Importance Heatmap (SHAP Values)

Section ID / Tag: `feature_importance_shap_heatmap`

Detailed Description:

This heatmap visualizes **which linguistic features contributed the most to predicting a selected emotional outcome** (e.g., Negative Affect) for a group of selected participants. It uses **SHAP (SHapley Additive exPlanations) values**, a popular interpretability method in machine learning, to explain the model's predictions for each participant.

📊 What the Heatmap Shows

- **Rows** represent **linguistic features** (e.g., "StressLength", "SocialReferents", "Clout", "Negations", etc.), which are extracted from participants' text using NLP tools like LIWC or custom dictionaries.
- **Columns** represent **individual participants** (e.g., K23101, K23104).
- **Cell color intensity** represents the **importance and direction** of the feature:
    - 🔴 **Red**: Feature increases predicted Negative Affect (positive SHAP value)
    - 🔵 **Blue**: Feature decreases predicted Negative Affect (negative SHAP value)
    - ⚪ **White/Gray**: Near-zero impact

👉 The darker the color, the greater the influence the feature has on the model's prediction for that participant.

🛠 Controls on the Left

1. **Outcome**
   Choose which emotional state you want to examine (e.g., Negative Affect, Angry, Nervous, Sad).
2. **Model**
   Select the machine learning model whose SHAP values are shown (e.g., Elastic Net or Random Forest).
3. **Use Absolute Values**
    - If checked: shows feature importance regardless of direction (great for ranking features)
    - If unchecked: shows **directional effects** (red = increasing the outcome, blue = decreasing)
4. **Participant Selector**
    - Choose specific participants to compare (or check "All" to include everyone)
    - Each selected participant is shown as a column in the heatmap.
5. **Minimum Feature Importance Threshold**
    - Adjust the slider to filter out features with very small SHAP values (i.e., low importance)
    - Green label = which values are **included**
    - Red label = which values are **filtered out**

🧠 How to Interpret It

- Want to know **why a model predicted high Negative Affect** for participant K23107? Look for **strong red bars** in their column — those are key features pushing the prediction higher.
- Curious about **protective language patterns**? Look for **strong blue bars** — those are features associated with **lower** predicted emotion levels.

- Comparing participants? Features like **“Clout”** or **“BigWords”** may be highly influential for some but irrelevant for others.

💬 Chatbot Suggestions You Could Enable

- “You're viewing which text features were most predictive of Negative Affect for each participant.”
- “Try turning on absolute values to see the top features across all participants regardless of direction.”
- “Would you like to explore what these features mean? I can explain ‘Clout’, ‘FocusPast’, or others in more detail.”
- “You can use the slider to focus on only the most influential features.”

Page 6: Feature Importance per Participant (SHAP Value)

UI & Data Controls:

- **Layout: Similar to Page 5, this page uses a two-column layout with controls in the right column and the visualization in the left column.**
- **Controls:**
  - **Outcome & Model Dropdowns: Allow the user to select the outcome and ML model (with outcome normalized).**
  - **Participant Dropdown: Enables the selection of a single participant from the loaded dataset.**
  - **Performance Metrics Loading: A secondary CSV is loaded to extract performance metrics (R^2 and RMSE) for the selected participant, which are later shown in the graph title.**
  - **Dynamic Symmetric Slider: As on Page 5, a slider is provided for setting the threshold for feature importance. It uses a symmetric range and displays an info box.**

Graph Details:

- **Graph Type: SHAP Summary Scatter Plot with Vertical Lines**
- **Axes:**
  - **X-Axis: Represents the SHAP (feature importance) values.**
  - **Y-Axis: Represents features. The y-axis values are evenly spaced for each feature, and feature names are used as tick labels.**
- **Data Processing:**
  - **Data is filtered for the selected participant and then filtered based on the chosen importance threshold.**
  - **The data is sorted by NLP method (and importance) and assigned evenly spaced y-axis positions.**
- **Colors:**
  - **Vertical Lines & Markers: Each feature's importance is shown with a line extending from 0 to the SHAP value, with a dot at the end. The color of the line and dot corresponds to the feature's NLP method (e.g., LIWC is red, GPT is blue, etc.).**
  - **Legend: Additional dummy traces ensure every NLP method appears in the legend.**
- **Additional Features:**
  - **The plot title includes the participant's name along with their performance metrics (R^2 and RMSE).**
  - **A dashed vertical line at x=0 helps delineate positive from negative importance.**

🧬 Feature Importance per Participant (SHAP Value)

Section ID / Tag: `shap_per_participant`

Detailed Description:

This page provides a personalized, participant-level view of feature importance using **SHAP values**, showing which specific linguistic features most influenced the model's prediction for a **single participant**. It's ideal for in-depth, idiographic analysis and model interpretation.

📈 What the Graph Shows (Right Panel)

- The **horizontal bar plot** displays **SHAP values** for the selected participant.
- Each bar represents a **linguistic feature** used in the model.
- **Bar direction** indicates **effect direction**:
  - ➕ Bars to the right (positive SHAP value) → feature **increases** predicted emotion (e.g., more Negative Affect)

    - ➖ Bars to the left (negative SHAP value) → feature **decreases** predicted emotion
- **Bar color** indicates the **NLP method** used to derive the feature:
    - 🔴 Red = LIWC
    - 🟢 Green = GPT
    - 🔵 Blue = VADER
    - ⚫ Black = TIME / Text Length-based
    - 🟣 Purple = Other methods (e.g., LDA, custom TEXT FEATURE)
- Top of the graph shows:
    - **R^2**: model accuracy for this participant
    - **RMSE**: model error for this participant

🛠 Controls (Left Panel)

1. **Outcome**
   Choose which emotional outcome is being predicted (e.g., Negative Affect, Angry, Nervous, Sad).
2. **Model**
   Select the machine learning model used (e.g., Elastic Net, Random Forest).
3. **Use Absolute Values**
    - If checked: sorts features purely by **magnitude** of importance (ignores direction)
    - If unchecked: keeps **directional insight** (shows whether the feature increases or decreases prediction)
4. **Include the Variable 'Time'**
   Toggle whether time is included as a predictor in the model.
5. **Participant Selector**
   Choose which participant's model explanation to display. Only one participant is shown at a time.
6. **Minimum Feature Importance Threshold**
   Use the slider to remove features with small SHAP values (between –0.005 and 0.005 by default).
    - ✅ Green label = values included
    - ❌ Red label = values filtered out

🧠 How to Interpret the Graph

- Want to understand what **drives Negative Affect** for participant K23101?
  → Look for the **largest red bars pointing right** — those features are increasing predicted distress.
- Curious which language might be **protective or calming**?
  → Look for bars pointing left — these features are associated with **lower predicted emotion**.
- Some features like `"StressLength"` or `"EnjoyLength"` (black) might reflect **text structure**, while `"Affiliation"`, `"Cognition"`, or `"Positive tone"` (red) reflect **psychological content**.

Page 7: Feature Importance Analysis
UI & Data Controls:

- **Layout: The page is divided into a left column for controls and a right column for the graphs.**
- **Controls:**
  - **Dropdowns:**
    - **ML Model & Outcome: Users select the model and outcome (with outcome standardized).**
  - **Checkbox: "Include the variable 'Time'" (default is checked).**
  - **Participant Filtering: A slider lets users select the percentage of participants in each group based on performance (R^2).**
  - **Minimum Variable Occurrence Slider: Sets a threshold for how many participants must have a feature for it to be included.**
- **Data Processing:**
  - **Performance Data: Loaded from a performance CSV, participants are split into high and low R^2 groups.**
  - **Feature Importance Data: Loaded from another CSV, with an option to exclude the "Time" variable.**
  - **Aggregation: The absolute mean importance for each feature is computed separately for high and low R^2 groups. The absolute mean difference is also calculated.**

Graph Details:

- **Graph Type: Bar Charts (two separate charts)**
- **First Bar Chart – High vs. Low R^2 Groups:**
  - **Axes:**
    - **X-Axis: Represents the absolute mean value for each group.**
    - **Y-Axis: Lists the features (sorted by the high R^2 group's values) with labels color-coded by NLP method.**
  - **Bars:**
    - **Two sets of bars for each feature: one for the high R^2 group (colored red) and one for the low R^2 group (colored turquoise).**
- **Second Bar Chart – Absolute Mean Difference:**
  - **Axes:**
    - **X-Axis: Represents the absolute mean difference between the high and low R^2 groups.**
    - **Y-Axis: Lists the top features (sorted by difference) with color-coded labels.**
  - **Bars:**
    - **A single set of gray bars represents the difference.**
- **Colors:**
  - **The bar colors (red, turquoise, and gray) are chosen to clearly contrast the groups, and the y-axis labels are enhanced with HTML to include NLP method colors.**

Legend:

- **An HTML-based legend at the bottom explains the NLP method color coding.**

🧠 Feature Importance Analysis: High vs. Low Model Performance

Section ID / Tag: `feature_importance_group_analysis`

Detailed Description:

This page compares feature importance across two participant groups: those for whom the model performed **well (High R^2)** vs. those for whom it performed **poorly (Low R^2)**. It helps you identify which features tend to matter **more** for accurate predictions and which may be linked to **poor model performance**.

📊 Visualizations

🔺 *Top Panel – Feature Importance (Top 20): High vs. Low R^2 Groups*

- This **grouped bar chart** shows the **average SHAP importance** (absolute values) for the top 20 most influential features across both groups.
- **Red bars** = participants in the **High R^2** group
- **Teal bars** = participants in the **Low R^2** group
- **Longer bars** = more impactful features

This helps answer questions like:
"Which features drive better predictions?" or
"Are certain features more influential in poorly performing models?"

▽ *Bottom Panel – Difference in Importance (Top 20)*

- This **gray bar chart** shows the **absolute difference** in feature importance between the High and Low R^2 groups.
- A large bar means the feature's role is **markedly different** between well-performing and poorly-performing models.
- Useful for identifying **diagnostic features** — those that might indicate when a model will generalize well vs. when it will fail.

🛠 Controls (Left Panel)

1. **ML Model**
   Choose the machine learning model used to generate SHAP values (e.g., Elastic Net, Random Forest).
2. **Outcome**
   Select the predicted emotional outcome (e.g., Negative Affect, Angry, Nervous, Sad).
3. **Include the Variable 'Time'**
   Toggle whether time was included as a predictor in the model.
4. **Percentage of Participants in Each Group**
   - Defines the split between "High" and "Low" R^2 groups.
   - For example, setting to 25% means the top 25% of participants (by R^2) are the High group, and the bottom 25% are the Low group.
5. **Minimum Number of Participants per Variable**
   - Filters out features that were only important for very few participants.
   - Ensures that only more **generalizable** features are displayed.

Page 8: Common Top Predictive Features
UI & Data Controls:

- **Layout: This page uses a sidebar layout.**
  - **Left Sidebar (Controls):**
    - **Model Selection Dropdown: Allows the choice between Elastic Net (EN) and Random Forest (RF).**
    - **Sliders:**
      - **Number of Features per Participant (determines how many top features per participant are selected).**
      - **Number of Variables in Figure (sets how many variables appear in the aggregate view).**
      - **SHAP Value Threshold (filters features based on a minimum absolute SHAP value).**
    - **Checkbox: "Use ABS values only" toggles the data source and indicates that only absolute values are considered.**
- **Data Processing:**
  - **For each emotion (na, sad, angry, nervous), a CSV file is loaded based on the selected model and whether ABS values are used.**
  - **Each participant's top features (based on the SHAP threshold) are aggregated. The count of participants selecting each feature is calculated, and the SHAP sign (Positive or Negative) is determined.**
- **Graph Details:**
  - **Graph Type: Stacked Horizontal Bar Charts**
  - **Axes:**

        - **X-Axis: Represents the "count" (or percentage of participants) in which the feature is selected.**
        - **Y-Axis: Represents the feature names, with labels color-coded based on their associated NLP method.**
    - **Bar Colors:**
        - **Bars are split by SHAP sign:**

💡 Common Top Predictive Features

Section ID / Tag: `common_top_features_across_emotions`

Detailed Description:

This page highlights the **most commonly important features** across participants when predicting different emotional outcomes using SHAP values. It shows which linguistic/textual features appear most often among participants as top predictors — and whether their impact tends to be **positive** or **negative** in driving emotion predictions.

📊 What the Plots Show (Right Panel)

There are **four horizontal bar plots**, one for each emotional outcome:

- **Negative Affect**
- **Sad**
- **Angry**
- **Nervous**

Each plot shows:

- The **top features** (e.g., "Time", "StressLength", "Clout", "Authentic")
- The **percent of participants** for whom each feature was among their most important predictors
- Bar color indicates **direction of the effect**:
    - 🔴 **Red** = Negative SHAP value → feature is associated with **lower emotion**
    - 🟦 **Teal** = Positive SHAP value → feature is associated with **higher emotion**

For example: If "Time" is shown in teal for 30% of participants predicting sadness, it means that for 30% of people, longer time between texts was associated with **higher sadness**.

🛠 Controls (Left Panel)

1. **Model**
   Select the machine learning model used to generate the SHAP values (e.g., Elastic Net).

2. **Number of Features per Participant**
   Sets how many top features are considered for each participant when calculating commonality.
3. **Number of Variables in Figure**
   Controls how many features (e.g., top 5, top 10, top 20) are displayed in each plot.
4. **SHAP Value Threshold**
   Filters out features with very small SHAP values. Only features above this threshold (in magnitude) are included.
5. **Use Absolute Values**
   - If unchecked (default): the graphs distinguish between positive and negative effects (e.g., red vs. teal bars)
   - If checked: treats positive and negative values the same, focusing only on strength of importance

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🧠 How to Interpret the Results

- Features like **"Authentic"**, **"Analytic"**, and **"Time"** consistently appear as top predictors across all four emotional outcomes — suggesting they are **generally influential** in emotion prediction models.
- Some features (e.g., **"StressLength"** or **"Clout"**) have **mixed effects** — they may increase emotion in some participants but decrease it in others.
- Features at the top of each chart (especially with both red and teal bars) may reflect **context-sensitive predictors** — important, but not universally in the same direction.

💬 Chatbot Suggestions You Can Enable

- "You're seeing which features are most commonly important across participants for each emotion."
- "Would you like to explore what 'Authentic' or 'Clout' mean? I can explain that."
- "Try adjusting the 'Number of Features per Participant' to see if the most common predictors change."
- "Curious whether these features behave differently for individual participants? Check the personalized SHAP view."

        - **Positive Values: Shown in a teal-like color (rgb(0,182,185)).**
        - **Negative Values: Shown in a red hue (rgb(255,79,82)).**
- **Layout of Graphs:**
    - **The four emotion-specific bar charts are arranged in a 2×2 grid in the main area.**
- **Legend:**
    - **A legend below the charts (rendered in HTML) explains the NLP method colors.**