**ALGORITHM 1:** Extracting layer-wise principal component in Gender subspace.

**Input :** - Strings pair $(S_m, S_f)$, which differ only in gender-specific words.

**Output :** - $P$=Layer-wise principal component set $\{P_0, \ldots, P_{12}\}$.

$W_{tf} \leftarrow \texttt{Tokenize}(S_f)$ /* WP Tokenization */

$W_{tm} \leftarrow \texttt{Tokenize}(S_m)$ /* WP Tokenization */

$u_0 \leftarrow \texttt{Layer}_0(W_{tf})$ /* Context-independent input vectors for $S_f$ */

$v_0 \leftarrow \texttt{Layer}_0(W_{tm})$ /* Context-independent input vectors for $S_m$ */

$D_0 \leftarrow (v_0 - u_0)$ /* Difference vector */

$P_0 \leftarrow \texttt{PCA}(D_0)$ /* PC with maximum EV */

**for** $j \leftarrow [1, 2, \ldots, 12]$ **do**

  $u^*_{j-1} \leftarrow \texttt{Proj}_{\perp P_{j-1}}(u_{j-1})$ /* Perpendicular projection */

  $v^*_{j-1} \leftarrow \texttt{Proj}_{\perp P_{j-1}}(v_{j-1})$

  $u_j \leftarrow \texttt{Layer}_j(u^*_{j-1})$

  $v_j \leftarrow \texttt{Layer}_j(v^*_{j-1})$

  $D_j \leftarrow (v_j - u_j)$ /* Difference vector */

  $P_j \leftarrow \texttt{PCA}(D_j)$

**end**

$x_{1New}$