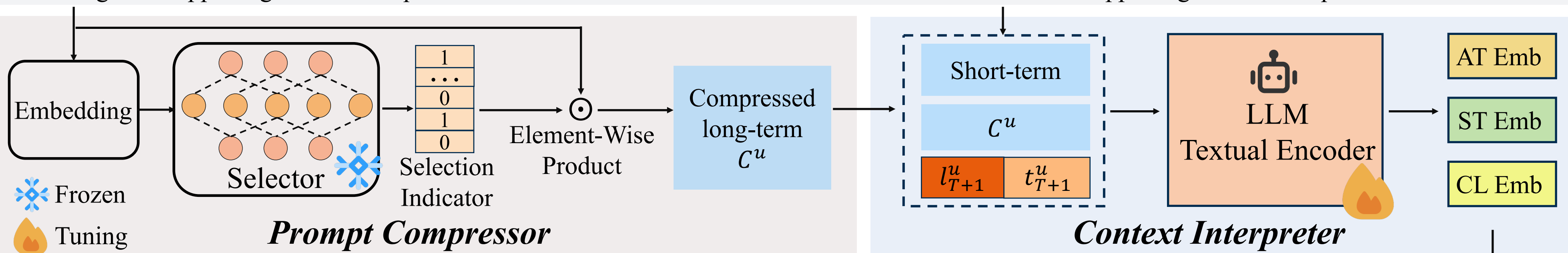


Figure 1 illustrates the data representation. The timeline shows a sequence of app usage records. The Long-term App Usage Record Sequence includes records $S_1^u, S_2^u, S_3^u, \dots, S_{T'}^u$. Each record S_i^u is represented as a vector $[l_i^u, t_i^u, a_i^u, x_i^u]$. The Short-term App Usage Record Sequence includes records $S_{T'+1}^u, \dots, S_T^u$. The record S_{T+1}^u is shown as $[l_{T+1}^u, t_{T+1}^u, a_{T+1}^u, x_{T+1}^u]$, with the last two elements in grey.



Phase 1

Given the historical app category with traffic level sequence: $\langle CL Emb_1 \rangle, \dots \langle CL Emb_N \rangle$, the trajectory: $\langle ST Emb_1 \rangle, \dots \langle ST Emb_N \rangle$, and the next app usage occurring at $\langle ST Emb_{T+1} \rangle$,

predict the next app category and traffic level.

 $CL\ Emb_{\tau+1}$

Phase 2

Given the long-term historical app with traffic sequence: $\langle AT Emb_1 \rangle, \dots \langle AT Emb_N \rangle$, the recent sequence: $\langle AT Emb_{T'+1} \rangle, \dots \langle AT Emb_T \rangle$, and the next app category and traffic level $\langle CL Emb_{T+1} \rangle$,

predict the next app and traffic.

$\hat{a}_{\tau+1}^u$	$\hat{x}_{\tau+1}^u$
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Hierarchical Predictor