Appendix A

The AL Language

One of the main design aspects of *Business Central* (BC) is that all business logic is written in a custom Application Language (AL), hiding all implementation details dealing with the technology.

Extensions can be provided for the *Business Central* runtime to add business functionality and to fit customers' requirements as much as desired. Such extensions are not only written by Microsoft, as users can customize their experience via extensions as required.

This effectively creates an ecosystem of AL software, for diverse use cases of BC as an ERP.

Adding a language abstraction forces abstraction layers to what is possible within the language and effectively separates business logic from technology implementation specifics. This has allowed the product to evolve throughout the years and experience several changes that with a different design would be harder to achieve, for example: changing the database engine, or migrating to a cloud environment. Additionally, the language continues to evolve and be actively maintained by the team, to keep up with the requirements a modern language infrastructure requires.

Interestingly, this approach has been successfully used by other products as well. For example, another ERP: SAP, has the language ABAP. A custom Domain Specific Language (DSL) resembling COBOL to extend the functionality of the system.

In this section, we give a brief tour of AL, *Business Central*'s custom DSL for modifying its runtime. For a complete reference, we refer to Microsoft's documentation [1].

A.1 How does AL look?

In terms of syntax, AL resembles Pascal. It is an imperative, and procedural language. As a quick overview, we show some of the basic building blocks of the language in the following figures.

As you see, variables are *typed*. The `Record` variable type corresponds to records in a table on the underlying database of the system. As we will explain later, a user can also define the tables to use in this language.

```
var
    myInt: Integer;
    isValid: Boolean;
```

Figure A.1: Variable declaration in AL.

```
Amount := Total * myInt;
```

Figure A.2: Assignment and operations in AL.

```
if x = y then begin
    x := a;
    y := b;
end else
    y := b;
```

Figure A.3: Branching in AL.

```
procedure MyProcedure(Arg1: Integer;
           Arg2: Boolean): Integer
begin
    if Arg2 then
        exit(-Arg1)
    exit(Arg1)
end
```

Figure A.4: Declaring a procedure in AL.

```
<ObjectType> <ObjectID> <ObjectName>
{
    // Definition of the object
}
```

Figure A.5: Syntax to define an AL object.

A.2 AL objects and BC's runtime

Objects in AL are not the general objects as understood in the Object-Oriented Programming paradigm. Instead, they correspond to different units of BC's functionality.

Every code element in AL belongs to some object. To see the syntax of how to declare them, see figure A.5. It requires an `ObjectID` a positive integer, an `ObjectName` a string identifier, and an `ObjectType`.

We will show some of these `ObjectTypes`, and their effect on the runtime.

A.2.1 The Page type

Objects of `Page` type, correspond to interactive interfaces the user experience within the product.

In figure A.6 you can see the AL code used to define the page a user can interact with shown in figure A.7

```
page 379 "Bank Acc. Reconciliation"
{
    Caption = 'Bank Acc. Reconciliation';
    PageType = ListPlus;
    PromotedActionCategories = 'New,Process,Report,Bank,Matching,Posting';
    SaveValues = false;
    SourceTable = "Bank Acc. Reconciliation";
    SourceTableView = WHERE("Statement Type" = CONST("Bank Reconciliation"));

    layout
    {
        // ...
    }
}
```

Figure A.6: Example of an AL page.

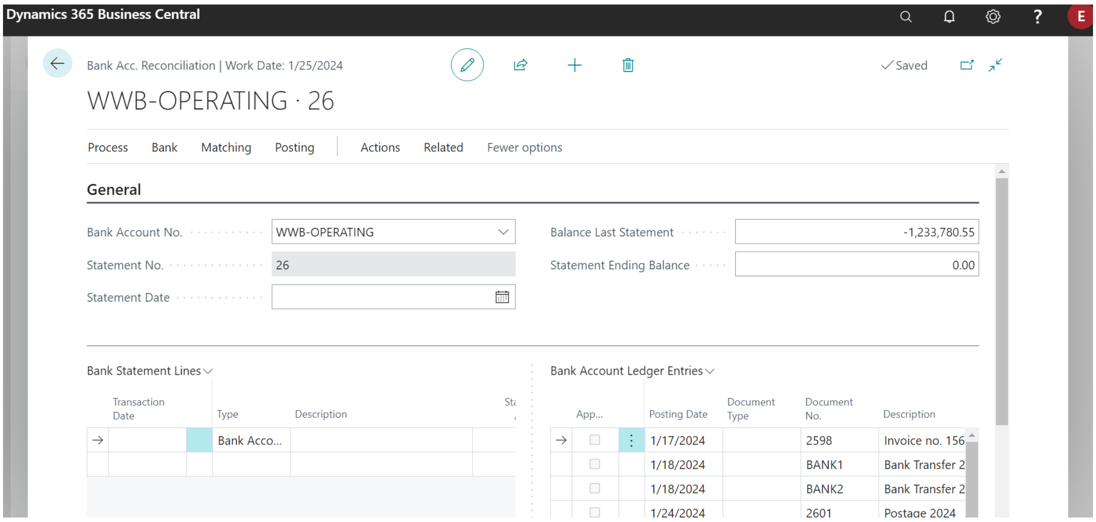

Figure A.7: The interface with which the user interacts, as defined by the AL page from figure A.6.

```
table 273 "Bank Acc. Reconciliation"
{
    Caption = 'Bank Acc. Reconciliation';
    DataCaptionFields = "Bank Account No.", "Statement No.";
    LookupPageID = "Bank Acc. Reconciliation List";
    Permissions = TableData "Bank Account" = rm,
                  TableData "Data Exch." = rimd;

    fields
    {
        field(1; "Bank Account No."; Code[20])
        {
            // ...
        }
        // ...
    }
    // ...
}
```

Figure A.8: Example of an AL Table.

A.2.2 The `Table` type

Objects of `Table` type, correspond to persistent storage in the system. Defining this object corresponds to creating a table in the underlying SQLServer database.

Having defined a table, a developer can now use `Record` type variables of such table, to manipulate and use this table as required, effectively acting as a data layer abstraction.

In figure A.8 you can see the definition of a table, and in figure A.9 how data can be manipulated by the usage of a `Record` variable.

A.2.3 The `Codeunit` type

Objects of `Codeunit` type, correspond to logical units of functionality, much like *modules* in other languages. They are a set of procedures that can be called from anywhere else within the AL codebase with certain access modifiers.

In figure A.10 you can see a procedure defined in a codeunit and in figure A.11 an example of it being used from a different AL object.

```
    // ...
    CurrPage.Update(false);
    if not BankAccReconciliation.IsEmpty() then begin
        BankAccReconciliation.Validate("Statement Ending Balance", 0.0);
        BankAccReconciliation.Modify();
    end;
    // ...
```

Figure A.9: Example of using a record `BankAccReconciliation` of the type defined by the table in figure A.8.

```
codeunit 18 "Financial Report Mgt."
{

    TableNo = "Financial Report";

    var
        AccSchedLine: Record "Acc. Schedule Line";
        FinRepPrefixTxt: Label 'FIN.REP.', MaxLength = 10, // ...
        TwoPosTxt: Label '%1%2', Locked = true;
    // ...
    procedure XMLExchangeExport(FinancialReport: Record "Financial Report")
    var
        ConfigPackage: Record "Config. Package";
        ConfigXMLExchange: Codeunit "Config. XML Exchange";
    begin
        AddFinancialReportToConfigPackage(FinancialReport.Name, ConfigPackage);
        Commit();
        ConfigXMLExchange.ExportPackage(ConfigPackage);
    end;


    local procedure AddFinancialReportToConfigPackage(FinancialReportName: Code[10]; var ConfigPackage //...
    // ...
}
```

Figure A.10: Example of an AL Codeunit.

```
    // ...
    trigger OnAction()
    var
        FinancialReportMgt: Codeunit "Financial Report Mgt.";
    begin
        FinancialReportMgt.XMLExchangeExport(Rec);
    end;
    // ...
```

Figure A.11: Usage of the procedure defined in figure A.10 in a different AL object

```
codeunit 134141 "ERM Bank Reconciliation"
{
    Permissions = TableData "Bank Account Ledger Entry" = ri,
                  TableData "Bank Account Statement" = rimd;
    Subtype = Test;
    TestPermissions = NonRestrictive;
    // ...
    [Test]
    [Scope('OnPrem')]
    procedure BankAccReconciliationBalanceToReconcile()
    var
        BankAccReconciliation: Record "Bank Acc. Reconciliation";
        GenJournalLine: Record "Gen. Journal Line";
        BankAccReconciliationPage: TestPage "Bank Acc. Reconciliation";
        BalanceToReconcile: Decimal;
        i: Integer;
    begin
        // [SCENARIO 363054] "Balance to Reconcile" does not include amounts from Posted Bank Reconciliations
        Initialize();

        // [GIVEN] Posted Bank Reconciliation A with Amount X
        CreateAndPostGenJournalLine(GenJournalLine, CreateBankAccount);
        CreateSuggestedBankReconc(BankAccReconciliation, GenJournalLine."Bal. Account No.", false);
        LibraryERM.PostBankAccReconciliation(BankAccReconciliation);

        // [GIVEN] Bank Reconciliation B with Amount Y
        for i := 1 to LibraryRandom.RandInt(5) do begin
            CreateAndPostGenJournalLine(GenJournalLine, GenJournalLine."Bal. Account No.");
            BalanceToReconcile += GenJournalLine.Amount;
        end;
        Clear(BankAccReconciliation);
        CreateSuggestedBankReconc(BankAccReconciliation, GenJournalLine."Bal. Account No.", false);

        // [WHEN] Bank Reconciliation B page is opened
        LibraryLowerPermissions.AddAccountReceivables;
        BankAccReconciliationPage.OpenView;
        BankAccReconciliationPage.GotoRecord(BankAccReconciliation);

        // [THEN] "Balance To Reconcile" = Y.
        Assert.AreEqual(
          -BalanceToReconcile,
          BankAccReconciliationPage.ApplyBankLedgerEntries.BalanceToReconcile.AsDEcimal,
          StrSubstNo(
            WrongAmountErr, BankAccReconciliationPage.ApplyBankLedgerEntries.BalanceToReconcile.Caption,
            -BalanceToReconcile));
    end;
    // ...
}
```

Figure A.12: Example of a test codeunit and test procedure.

A.3 AL Tests

Of particular relevance for this project, is how tests are defined in this language. Tests in AL are defined on AL objects of type `Codeunit` with appropriate annotations.

Depending on the scope of a test, these tests can be integration tests or unit tests. See an example of a test in figure A.12.

The test infrastructure required for running these scenarios with different settings is also maintained by the team and written in AL itself. We go to a bit more detail, as required in section **??**.

We have just scratched the surface with this brief introduction, as it is meant to give a general idea of the type of programs and tests that this thesis project centers around.

Appendix B

Evaluation results

For completeness, we present a list of the main metrics obtained for the different algorithms, ranking configurations and hyperparameters considered.

More concretely, we present the distribution metrics of $NAPFD$ and t_{ff} of each different configuration. We also present the size of the induced selections of each configuration and their corresponding execution times.

More values and distribution plots can be found in the accompanying repository of this project.

Table B.1: $NAPFD$ per dataset, algorithm and configuration

Dataset	Algorithm	Training metric	# of trees	$NAPFD$			
				Average	Variance	Minimum	Maximum
CP-CI	coordinateascent	NDCG@10		0.7	0.08	0.17	0.99
EP-CI	coordinateascent	NDCG@10		0.62	0.11	0.31	1
CP-NCI	coordinateascent	NDCG@10		0.86	0.01	0.67	1
EP-NCI	coordinateascent	NDCG@10		0.86	0.01	0.67	1
CP-CI	coordinateascent	DCG@10		0.7	0.07	0.17	0.96
EP-CI	coordinateascent	DCG@10		0.67	0.09	0.12	1
CP-NCI	coordinateascent	DCG@10		0.86	0.01	0.67	1
EP-NCI	coordinateascent	DCG@10		0.86	0.01	0.67	1
CP-CI	coordinateascent	MAP		0.51	0.1	0.17	1
EP-CI	coordinateascent	MAP		0.51	0.1	0.17	1
CP-NCI	coordinateascent	MAP		0.86	0.01	0.67	1
EP-NCI	coordinateascent	MAP		0.86	0.01	0.67	1
CP-CI	coordinateascent	NDCG@20		0.73	0.08	0.17	1
EP-CI	coordinateascent	NDCG@20		0.62	0.11	0.31	1
CP-NCI	coordinateascent	NDCG@20		0.86	0.01	0.67	1
EP-NCI	coordinateascent	NDCG@20		0.86	0.01	0.67	1
CP-CI	coordinateascent	NDCG@30		0.71	0.08	0.17	1
EP-CI	coordinateascent	NDCG@30		0.88	0.01	0.75	1
CP-NCI	coordinateascent	NDCG@30		0.86	0.01	0.67	1
EP-NCI	coordinateascent	NDCG@30		0.86	0.01	0.67	1
CP-CI	lambdamart	NDCG@10	30	0.56	0.04	0.19	0.74
EP-CI	lambdamart	NDCG@10	30	0.79	0.02	0.66	1
CP-NCI	lambdamart	NDCG@10	30	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@10	30	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@10	20	0.65	0.01	0.51	0.82
EP-CI	lambdamart	NDCG@10	20	0.68	0.04	0.5	0.99
CP-NCI	lambdamart	NDCG@10	20	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@10	20	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@10	10	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@10	10	0.64	0.04	0.48	0.99
CP-NCI	lambdamart	NDCG@10	10	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@10	10	0.77	0.05	0.33	1
CP-CI	lambdamart	NDCG@10	5	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@10	5	0.64	0.05	0.48	0.99
CP-NCI	lambdamart	NDCG@10	5	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@10	5	0.56	0.11	0.22	1
CP-CI	lambdamart	DCG@10	30	0.75	0.02	0.51	0.95
EP-CI	lambdamart	DCG@10	30	0.69	0.08	0.38	1
CP-NCI	lambdamart	DCG@10	30	0.86	0.01	0.67	1
EP-NCI	lambdamart	DCG@10	30	0.65	0.08	0.34	1
CP-CI	lambdamart	DCG@10	20	0.71	0.01	0.61	0.85
EP-CI	lambdamart	DCG@10	20	0.69	0.08	0.38	1
CP-NCI	lambdamart	DCG@10	20	0.86	0.01	0.67	1
EP-NCI	lambdamart	DCG@10	20	0.86	0.01	0.67	1
CP-CI	lambdamart	DCG@10	10	0.71	0.01	0.61	0.85
EP-CI	lambdamart	DCG@10	10	0.69	0.08	0.38	1
CP-NCI	lambdamart	DCG@10	10	0.86	0.01	0.67	1
EP-NCI	lambdamart	DCG@10	10	0.56	0.11	0.22	1
CP-CI	lambdamart	DCG@10	5	0.71	0.01	0.61	0.85

Table B.1: $NAPFD$ per dataset, algorithm and configuration

EP-CI	lambdamart	DCG@10	5	0.6	0.09	0.33	1
CP-NCI	lambdamart	DCG@10	5	0.79	0.02	0.66	1
EP-NCI	lambdamart	DCG@10	5	0.65	0.08	0.34	1
CP-CI	lambdamart	MAP	30	0.67	0	0.66	0.67
EP-CI	lambdamart	MAP	30	0.67	0	0.66	0.67
CP-NCI	lambdamart	MAP	30	0.67	0	0.66	0.67
EP-NCI	lambdamart	MAP	30	0.67	0	0.66	0.67
CP-CI	lambdamart	MAP	20	0.67	0	0.66	0.67
EP-CI	lambdamart	MAP	20	0.67	0	0.66	0.67
CP-NCI	lambdamart	MAP	20	0.67	0	0.66	0.67
EP-NCI	lambdamart	MAP	20	0.67	0	0.66	0.67
CP-CI	lambdamart	MAP	10	0.67	0	0.66	0.67
EP-CI	lambdamart	MAP	10	0.67	0	0.66	0.67
CP-NCI	lambdamart	MAP	10	0.67	0	0.66	0.67
EP-NCI	lambdamart	MAP	10	0.67	0	0.66	0.67
CP-CI	lambdamart	MAP	5	0.67	0	0.66	0.67
EP-CI	lambdamart	MAP	5	0.67	0	0.66	0.67
CP-NCI	lambdamart	MAP	5	0.67	0	0.66	0.67
EP-NCI	lambdamart	MAP	5	0.67	0	0.66	0.67
CP-CI	lambdamart	NDCG@20	30	0.68	0.07	0.13	0.95
EP-CI	lambdamart	NDCG@20	30	0.64	0.04	0.48	1
CP-NCI	lambdamart	NDCG@20	30	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@20	30	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@20	20	0.62	0.02	0.34	0.81
EP-CI	lambdamart	NDCG@20	20	0.64	0.05	0.49	1
CP-NCI	lambdamart	NDCG@20	20	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@20	20	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@20	10	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@20	10	0.66	0.05	0.43	0.99
CP-NCI	lambdamart	NDCG@20	10	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@20	10	0.42	0.1	0	0.99
CP-CI	lambdamart	NDCG@20	5	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@20	5	0.67	0.04	0.5	0.99
CP-NCI	lambdamart	NDCG@20	5	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@20	5	0.42	0.1	0	0.99
CP-CI	lambdamart	NDCG@30	30	0.69	0.06	0.19	0.94
EP-CI	lambdamart	NDCG@30	30	0.53	0.06	0.18	0.89
CP-NCI	lambdamart	NDCG@30	30	0.86	0.01	0.67	1
EP-NCI	lambdamart	NDCG@30	30	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@30	20	0.64	0.01	0.51	0.77
EP-CI	lambdamart	NDCG@30	20	0.6	0.03	0.33	0.93
CP-NCI	lambdamart	NDCG@30	20	0.72	0.11	0.01	1
EP-NCI	lambdamart	NDCG@30	20	0.56	0.11	0.22	1
CP-CI	lambdamart	NDCG@30	10	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@30	10	0.79	0.02	0.66	1
CP-NCI	lambdamart	NDCG@30	10	0.72	0.11	0.01	1
EP-NCI	lambdamart	NDCG@30	10	0.42	0.1	0	0.99
CP-CI	lambdamart	NDCG@30	5	0.71	0.01	0.61	0.85
EP-CI	lambdamart	NDCG@30	5	0.54	0.07	0	0.86
CP-NCI	lambdamart	NDCG@30	5	0.72	0.11	0.01	1
EP-NCI	lambdamart	NDCG@30	5	0.42	0.1	0	0.99
CP-CI	mart	NDCG@10	30	0.67	0.09	0.13	1

Table B.1: $NAPFD$ per dataset, algorithm and configuration

EP-CI	mart	NDCG@10	30	0.42	0.07	0	0.87
CP-NCI	mart	NDCG@10	30	0.86	0.01	0.67	1
EP-NCI	mart	NDCG@10	30	0.71	0.05	0.34	1
CP-CI	mart	NDCG@10	20	0.67	0.09	0.13	1
EP-CI	mart	NDCG@10	20	0.45	0.06	0	0.83
CP-NCI	mart	NDCG@10	20	0.72	0.11	0.01	1
EP-NCI	mart	NDCG@10	20	0.57	0.06	0	0.67
CP-CI	mart	NDCG@10	10	0.68	0.08	0.17	1
EP-CI	mart	NDCG@10	10	0.48	0.07	0	0.86
CP-NCI	mart	NDCG@10	10	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@10	10	0.57	0.06	0	0.67
CP-CI	mart	NDCG@10	5	0.68	0.08	0.17	1
EP-CI	mart	NDCG@10	5	0.54	0.07	0	0.88
CP-NCI	mart	NDCG@10	5	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@10	5	0.57	0.06	0	0.67
CP-CI	mart	ERR@10	30	0.67	0.09	0.13	1
EP-CI	mart	ERR@10	30	0.42	0.07	0	0.87
CP-NCI	mart	ERR@10	30	0.86	0.01	0.67	1
EP-NCI	mart	ERR@10	30	0.71	0.05	0.34	1
CP-CI	mart	ERR@10	20	0.67	0.09	0.13	1
EP-CI	mart	ERR@10	20	0.45	0.06	0	0.83
CP-NCI	mart	ERR@10	20	0.72	0.11	0.01	1
EP-NCI	mart	ERR@10	20	0.57	0.06	0	0.67
CP-CI	mart	ERR@10	10	0.68	0.08	0.17	1
EP-CI	mart	ERR@10	10	0.48	0.07	0	0.86
CP-NCI	mart	ERR@10	10	0.57	0.06	0.01	0.67
EP-NCI	mart	ERR@10	10	0.57	0.06	0	0.67
CP-CI	mart	ERR@10	5	0.68	0.08	0.17	1
EP-CI	mart	ERR@10	5	0.54	0.07	0	0.88
CP-NCI	mart	ERR@10	5	0.57	0.06	0.01	0.67
EP-NCI	mart	ERR@10	5	0.57	0.06	0	0.67
CP-CI	mart	DCG@10	30	0.67	0.09	0.13	1
EP-CI	mart	DCG@10	30	0.42	0.07	0	0.87
CP-NCI	mart	DCG@10	30	0.86	0.01	0.67	1
EP-NCI	mart	DCG@10	30	0.71	0.05	0.34	1
CP-CI	mart	DCG@10	20	0.67	0.09	0.13	1
EP-CI	mart	DCG@10	20	0.45	0.06	0	0.83
CP-NCI	mart	DCG@10	20	0.72	0.11	0.01	1
EP-NCI	mart	DCG@10	20	0.57	0.06	0	0.67
CP-CI	mart	DCG@10	10	0.68	0.08	0.17	1
EP-CI	mart	DCG@10	10	0.48	0.07	0	0.86
CP-NCI	mart	DCG@10	10	0.57	0.06	0.01	0.67
EP-NCI	mart	DCG@10	10	0.57	0.06	0	0.67
CP-CI	mart	DCG@10	5	0.68	0.08	0.17	1
EP-CI	mart	DCG@10	5	0.54	0.07	0	0.88
CP-NCI	mart	DCG@10	5	0.57	0.06	0.01	0.67
EP-NCI	mart	DCG@10	5	0.57	0.06	0	0.67
CP-CI	mart	MAP	30	0.67	0.09	0.13	1
EP-CI	mart	MAP	30	0.42	0.07	0	0.87
CP-NCI	mart	MAP	30	0.86	0.01	0.67	1
EP-NCI	mart	MAP	30	0.71	0.05	0.34	1
CP-CI	mart	MAP	20	0.67	0.09	0.13	1

Table B.1: $NAPFD$ per dataset, algorithm and configuration

EP-CI	mart	MAP	20	0.45	0.06	0	0.83
CP-NCI	mart	MAP	20	0.72	0.11	0.01	1
EP-NCI	mart	MAP	20	0.57	0.06	0	0.67
CP-CI	mart	MAP	10	0.68	0.08	0.17	1
EP-CI	mart	MAP	10	0.48	0.07	0	0.86
CP-NCI	mart	MAP	10	0.57	0.06	0.01	0.67
EP-NCI	mart	MAP	10	0.57	0.06	0	0.67
CP-CI	mart	MAP	5	0.68	0.08	0.17	1
EP-CI	mart	MAP	5	0.54	0.07	0	0.88
CP-NCI	mart	MAP	5	0.57	0.06	0.01	0.67
EP-NCI	mart	MAP	5	0.57	0.06	0	0.67
CP-CI	mart	NDCG@20	30	0.67	0.09	0.13	1
EP-CI	mart	NDCG@20	30	0.42	0.07	0	0.87
CP-NCI	mart	NDCG@20	30	0.86	0.01	0.67	1
EP-NCI	mart	NDCG@20	30	0.71	0.05	0.34	1
CP-CI	mart	NDCG@20	20	0.67	0.09	0.13	1
EP-CI	mart	NDCG@20	20	0.45	0.06	0	0.83
CP-NCI	mart	NDCG@20	20	0.72	0.11	0.01	1
EP-NCI	mart	NDCG@20	20	0.57	0.06	0	0.67
CP-CI	mart	NDCG@20	10	0.68	0.08	0.17	1
EP-CI	mart	NDCG@20	10	0.48	0.07	0	0.86
CP-NCI	mart	NDCG@20	10	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@20	10	0.57	0.06	0	0.67
CP-CI	mart	NDCG@20	5	0.68	0.08	0.17	1
EP-CI	mart	NDCG@20	5	0.54	0.07	0	0.88
CP-NCI	mart	NDCG@20	5	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@20	5	0.57	0.06	0	0.67
CP-CI	mart	NDCG@30	30	0.67	0.09	0.13	1
EP-CI	mart	NDCG@30	30	0.42	0.07	0	0.87
CP-NCI	mart	NDCG@30	30	0.86	0.01	0.67	1
EP-NCI	mart	NDCG@30	30	0.71	0.05	0.34	1
CP-CI	mart	NDCG@30	20	0.67	0.09	0.13	1
EP-CI	mart	NDCG@30	20	0.45	0.06	0	0.83
CP-NCI	mart	NDCG@30	20	0.72	0.11	0.01	1
EP-NCI	mart	NDCG@30	20	0.57	0.06	0	0.67
CP-CI	mart	NDCG@30	10	0.68	0.08	0.17	1
EP-CI	mart	NDCG@30	10	0.48	0.07	0	0.86
CP-NCI	mart	NDCG@30	10	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@30	10	0.57	0.06	0	0.67
CP-CI	mart	NDCG@30	5	0.68	0.08	0.17	1
EP-CI	mart	NDCG@30	5	0.54	0.07	0	0.88
CP-NCI	mart	NDCG@30	5	0.57	0.06	0.01	0.67
EP-NCI	mart	NDCG@30	5	0.57	0.06	0	0.67

Table B.2: t_{ff} per dataset, algorithm and configuration

Dataset	Algorithm	Training metric	# of trees	t_{ff}			
				Average	Variance	Minimum	Maximum
CP-CI	coordinateascent	NDCG@10		0.15	0.11	0	0.89
EP-CI	coordinateascent	NDCG@10		0.02	0	0	0.14
CP-NCI	coordinateascent	NDCG@10		0	0	0	0.02
EP-NCI	coordinateascent	NDCG@10		0	0	0	0.02
CP-CI	coordinateascent	DCG@10		0.17	0.1	0	0.89
EP-CI	coordinateascent	DCG@10		0.13	0.11	0	0.88
CP-NCI	coordinateascent	DCG@10		0	0	0	0.02
EP-NCI	coordinateascent	DCG@10		0	0	0	0.02
CP-CI	coordinateascent	MAP		0.43	0.1	0	0.89
EP-CI	coordinateascent	MAP		0.43	0.1	0	0.89
CP-NCI	coordinateascent	MAP		0	0	0	0.02
EP-NCI	coordinateascent	MAP		0	0	0	0.02
CP-CI	coordinateascent	NDCG@20		0.14	0.11	0	0.89
EP-CI	coordinateascent	NDCG@20		0.02	0	0	0.14
CP-NCI	coordinateascent	NDCG@20		0	0	0	0.02
EP-NCI	coordinateascent	NDCG@20		0	0	0	0.02
CP-CI	coordinateascent	NDCG@30		0.14	0.11	0	0.88
EP-CI	coordinateascent	NDCG@30		0	0	0	0.01
CP-NCI	coordinateascent	NDCG@30		0	0	0	0.02
EP-NCI	coordinateascent	NDCG@30		0.01	0	0	0.02
CP-CI	lambdamart	NDCG@10	30	0.3	0.09	0	0.89
EP-CI	lambdamart	NDCG@10	30	0.04	0	0	0.14
CP-NCI	lambdamart	NDCG@10	30	0	0	0	0.02
EP-NCI	lambdamart	NDCG@10	30	0.06	0	0	0.14
CP-CI	lambdamart	NDCG@10	20	0.23	0.07	0	0.7
EP-CI	lambdamart	NDCG@10	20	0.08	0.01	0	0.2
CP-NCI	lambdamart	NDCG@10	20	0.01	0	0	0.02
EP-NCI	lambdamart	NDCG@10	20	0.06	0	0	0.14
CP-CI	lambdamart	NDCG@10	10	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@10	10	0.13	0.01	0.01	0.25
CP-NCI	lambdamart	NDCG@10	10	0	0	0	0.02
EP-NCI	lambdamart	NDCG@10	10	0	0	0	0.02
CP-CI	lambdamart	NDCG@10	5	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@10	5	0.12	0.03	0.01	0.45
CP-NCI	lambdamart	NDCG@10	5	0	0	0	0.02
EP-NCI	lambdamart	NDCG@10	5	0.06	0	0	0.14
CP-CI	lambdamart	DCG@10	30	0.17	0.06	0	0.7
EP-CI	lambdamart	DCG@10	30	0.05	0.01	0	0.18
CP-NCI	lambdamart	DCG@10	30	0	0	0	0.02
EP-NCI	lambdamart	DCG@10	30	0.04	0	0	0.14
CP-CI	lambdamart	DCG@10	20	0.1	0.01	0	0.28
EP-CI	lambdamart	DCG@10	20	0.05	0.01	0	0.18
CP-NCI	lambdamart	DCG@10	20	0	0	0	0.02
EP-NCI	lambdamart	DCG@10	20	0	0	0	0.02
CP-CI	lambdamart	DCG@10	10	0.1	0.01	0	0.28
EP-CI	lambdamart	DCG@10	10	0.05	0.01	0	0.18
CP-NCI	lambdamart	DCG@10	10	0	0	0	0.02
EP-NCI	lambdamart	DCG@10	10	0.06	0	0	0.14
CP-CI	lambdamart	DCG@10	5	0.1	0.01	0	0.28

Table B.2: t_{ff} per dataset, algorithm and configuration

EP-CI	lambdamart	DCG@10	5	0.15	0.02	0	0.36
CP-NCI	lambdamart	DCG@10	5	0.04	0	0	0.14
EP-NCI	lambdamart	DCG@10	5	0.04	0	0	0.14
CP-CI	lambdamart	MAP	30	0.07	0	0.03	0.14
EP-CI	lambdamart	MAP	30	0.07	0	0.03	0.14
CP-NCI	lambdamart	MAP	30	0.07	0	0.03	0.14
EP-NCI	lambdamart	MAP	30	0.07	0	0.03	0.14
CP-CI	lambdamart	MAP	20	0.07	0	0.03	0.14
EP-CI	lambdamart	MAP	20	0.07	0	0.03	0.14
CP-NCI	lambdamart	MAP	20	0.07	0	0.03	0.14
EP-NCI	lambdamart	MAP	20	0.07	0	0.03	0.14
CP-CI	lambdamart	MAP	10	0.07	0	0.03	0.14
EP-CI	lambdamart	MAP	10	0.07	0	0.03	0.14
CP-NCI	lambdamart	MAP	10	0.07	0	0.03	0.14
EP-NCI	lambdamart	MAP	10	0.07	0	0.03	0.14
CP-CI	lambdamart	MAP	5	0.07	0	0.03	0.14
EP-CI	lambdamart	MAP	5	0.07	0	0.03	0.14
CP-NCI	lambdamart	MAP	5	0.07	0	0.03	0.14
EP-NCI	lambdamart	MAP	5	0.07	0	0.03	0.14
CP-CI	lambdamart	NDCG@20	30	0.23	0.1	0	0.93
EP-CI	lambdamart	NDCG@20	30	0.1	0.01	0.01	0.25
CP-NCI	lambdamart	NDCG@20	30	0.01	0	0	0.02
EP-NCI	lambdamart	NDCG@20	30	0.06	0	0	0.14
CP-CI	lambdamart	NDCG@20	20	0.24	0.08	0	0.79
EP-CI	lambdamart	NDCG@20	20	0.14	0.02	0	0.43
CP-NCI	lambdamart	NDCG@20	20	0	0	0	0.02
EP-NCI	lambdamart	NDCG@20	20	0.06	0	0	0.14
CP-CI	lambdamart	NDCG@20	10	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@20	10	0.05	0	0.01	0.18
CP-NCI	lambdamart	NDCG@20	10	0.01	0	0	0.02
EP-NCI	lambdamart	NDCG@20	10	0.21	0.12	0.01	1
CP-CI	lambdamart	NDCG@20	5	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@20	5	0.09	0	0.01	0.17
CP-NCI	lambdamart	NDCG@20	5	0.01	0	0	0.02
EP-NCI	lambdamart	NDCG@20	5	0.21	0.12	0.01	1
CP-CI	lambdamart	NDCG@30	30	0.25	0.09	0	0.89
EP-CI	lambdamart	NDCG@30	30	0.28	0.1	0.01	0.86
CP-NCI	lambdamart	NDCG@30	30	0.01	0	0	0.02
EP-NCI	lambdamart	NDCG@30	30	0.04	0	0	0.09
CP-CI	lambdamart	NDCG@30	20	0.27	0.06	0	0.7
EP-CI	lambdamart	NDCG@30	20	0.13	0.05	0.01	0.6
CP-NCI	lambdamart	NDCG@30	20	0.15	0.14	0	0.99
EP-NCI	lambdamart	NDCG@30	20	0.06	0	0	0.14
CP-CI	lambdamart	NDCG@30	10	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@30	10	0.04	0	0	0.14
CP-NCI	lambdamart	NDCG@30	10	0.15	0.14	0	0.99
EP-NCI	lambdamart	NDCG@30	10	0.21	0.12	0.01	1
CP-CI	lambdamart	NDCG@30	5	0.1	0.01	0	0.28
EP-CI	lambdamart	NDCG@30	5	0.3	0.11	0	0.99
CP-NCI	lambdamart	NDCG@30	5	0.15	0.14	0	0.99
EP-NCI	lambdamart	NDCG@30	5	0.21	0.12	0.01	1
CP-CI	mart	NDCG@10	30	0.23	0.1	0	0.89

Table B.2: t_{ff} per dataset, algorithm and configuration

EP-CI	mart	NDCG@10	30	0.2	0.13	0.01	0.99
CP-NCI	mart	NDCG@10	30	0	0	0	0.02
EP-NCI	mart	NDCG@10	30	0.06	0	0	0.14
CP-CI	mart	NDCG@10	20	0.23	0.1	0	0.89
EP-CI	mart	NDCG@10	20	0.19	0.13	0.01	0.99
CP-NCI	mart	NDCG@10	20	0.17	0.13	0	0.99
EP-NCI	mart	NDCG@10	20	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@10	10	0.23	0.1	0	0.89
EP-CI	mart	NDCG@10	10	0.25	0.13	0.01	0.99
CP-NCI	mart	NDCG@10	10	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@10	10	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@10	5	0.23	0.1	0	0.89
EP-CI	mart	NDCG@10	5	0.18	0.13	0.01	0.99
CP-NCI	mart	NDCG@10	5	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@10	5	0.21	0.12	0.04	0.99
CP-CI	mart	ERR@10	30	0.23	0.1	0	0.89
EP-CI	mart	ERR@10	30	0.2	0.13	0.01	0.99
CP-NCI	mart	ERR@10	30	0	0	0	0.02
EP-NCI	mart	ERR@10	30	0.06	0	0	0.14
CP-CI	mart	ERR@10	20	0.23	0.1	0	0.89
EP-CI	mart	ERR@10	20	0.19	0.13	0.01	0.99
CP-NCI	mart	ERR@10	20	0.17	0.13	0	0.99
EP-NCI	mart	ERR@10	20	0.21	0.12	0.04	0.99
CP-CI	mart	ERR@10	10	0.23	0.1	0	0.89
EP-CI	mart	ERR@10	10	0.25	0.13	0.01	0.99
CP-NCI	mart	ERR@10	10	0.21	0.12	0.04	0.99
EP-NCI	mart	ERR@10	10	0.21	0.12	0.04	0.99
CP-CI	mart	ERR@10	5	0.23	0.1	0	0.89
EP-CI	mart	ERR@10	5	0.18	0.13	0.01	0.99
CP-NCI	mart	ERR@10	5	0.21	0.12	0.04	0.99
EP-NCI	mart	ERR@10	5	0.21	0.12	0.04	0.99
CP-CI	mart	DCG@10	30	0.23	0.1	0	0.89
EP-CI	mart	DCG@10	30	0.2	0.13	0.01	0.99
CP-NCI	mart	DCG@10	30	0	0	0	0.02
EP-NCI	mart	DCG@10	30	0.06	0	0	0.14
CP-CI	mart	DCG@10	20	0.23	0.1	0	0.89
EP-CI	mart	DCG@10	20	0.19	0.13	0.01	0.99
CP-NCI	mart	DCG@10	20	0.17	0.13	0	0.99
EP-NCI	mart	DCG@10	20	0.21	0.12	0.04	0.99
CP-CI	mart	DCG@10	10	0.23	0.1	0	0.89
EP-CI	mart	DCG@10	10	0.25	0.13	0.01	0.99
CP-NCI	mart	DCG@10	10	0.21	0.12	0.04	0.99
EP-NCI	mart	DCG@10	10	0.21	0.12	0.04	0.99
CP-CI	mart	DCG@10	5	0.23	0.1	0	0.89
EP-CI	mart	DCG@10	5	0.18	0.13	0.01	0.99
CP-NCI	mart	DCG@10	5	0.21	0.12	0.04	0.99
EP-NCI	mart	DCG@10	5	0.21	0.12	0.04	0.99
CP-CI	mart	MAP	30	0.23	0.1	0	0.89
EP-CI	mart	MAP	30	0.2	0.13	0.01	0.99
CP-NCI	mart	MAP	30	0	0	0	0.02
EP-NCI	mart	MAP	30	0.06	0	0	0.14
CP-CI	mart	MAP	20	0.23	0.1	0	0.89

Table B.2: t_{ff} per dataset, algorithm and configuration

EP-CI	mart	MAP	20	0.19	0.13	0.01	0.99
CP-NCI	mart	MAP	20	0.17	0.13	0	0.99
EP-NCI	mart	MAP	20	0.21	0.12	0.04	0.99
CP-CI	mart	MAP	10	0.23	0.1	0	0.89
EP-CI	mart	MAP	10	0.25	0.13	0.01	0.99
CP-NCI	mart	MAP	10	0.21	0.12	0.04	0.99
EP-NCI	mart	MAP	10	0.21	0.12	0.04	0.99
CP-CI	mart	MAP	5	0.23	0.1	0	0.89
EP-CI	mart	MAP	5	0.18	0.13	0.01	0.99
CP-NCI	mart	MAP	5	0.21	0.12	0.04	0.99
EP-NCI	mart	MAP	5	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@20	30	0.23	0.1	0	0.89
EP-CI	mart	NDCG@20	30	0.2	0.13	0.01	0.99
CP-NCI	mart	NDCG@20	30	0	0	0	0.02
EP-NCI	mart	NDCG@20	30	0.06	0	0	0.14
CP-CI	mart	NDCG@20	20	0.23	0.1	0	0.89
EP-CI	mart	NDCG@20	20	0.19	0.13	0.01	0.99
CP-NCI	mart	NDCG@20	20	0.17	0.13	0	0.99
EP-NCI	mart	NDCG@20	20	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@20	10	0.23	0.1	0	0.89
EP-CI	mart	NDCG@20	10	0.25	0.13	0.01	0.99
CP-NCI	mart	NDCG@20	10	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@20	10	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@20	5	0.23	0.1	0	0.89
EP-CI	mart	NDCG@20	5	0.18	0.13	0.01	0.99
CP-NCI	mart	NDCG@20	5	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@20	5	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@30	30	0.23	0.1	0	0.89
EP-CI	mart	NDCG@30	30	0.2	0.13	0.01	0.99
CP-NCI	mart	NDCG@30	30	0	0	0	0.02
EP-NCI	mart	NDCG@30	30	0.06	0	0	0.14
CP-CI	mart	NDCG@30	20	0.23	0.1	0	0.89
EP-CI	mart	NDCG@30	20	0.19	0.13	0.01	0.99
CP-NCI	mart	NDCG@30	20	0.17	0.13	0	0.99
EP-NCI	mart	NDCG@30	20	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@30	10	0.23	0.1	0	0.89
EP-CI	mart	NDCG@30	10	0.25	0.13	0.01	0.99
CP-NCI	mart	NDCG@30	10	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@30	10	0.21	0.12	0.04	0.99
CP-CI	mart	NDCG@30	5	0.23	0.1	0	0.89
EP-CI	mart	NDCG@30	5	0.18	0.13	0.01	0.99
CP-NCI	mart	NDCG@30	5	0.21	0.12	0.04	0.99
EP-NCI	mart	NDCG@30	5	0.21	0.12	0.04	0.99

Table B.3: Selections induced by each configuration

Dataset	Algorithm	Training metric	# of trees	50-SEL		80-SEL		S-SEL	
				Size	Execution Time	Size	Execution Time	Size	Execution Time
EP-NCI	coordinateascent	NDCG@10		10	0.03	40	0.1	40	0.1
CP-CI	coordinateascent	NDCG@10		10	0.16	80	0.81	90	0.92
CP-NCI	coordinateascent	NDCG@10		10	0.03	40	0.1	40	0.1
EP-CI	coordinateascent	NDCG@10		30	0.22	90	0.77	90	0.77
EP-NCI	coordinateascent	DCG@10		10	0.03	40	0.1	40	0.1
CP-CI	coordinateascent	DCG@10		10	0.17	80	0.82	90	0.9
CP-NCI	coordinateascent	DCG@10		10	0.03	40	0.1	40	0.1
EP-CI	coordinateascent	DCG@10		30	0.22	80	0.84	100	1
EP-NCI	coordinateascent	MAP		10	0.03	40	0.1	40	0.1
CP-CI	coordinateascent	MAP		60	0.63	90	0.9	90	0.9
CP-NCI	coordinateascent	MAP		10	0.03	40	0.1	40	0.1
EP-CI	coordinateascent	MAP		60	0.63	90	0.9	90	0.9
EP-NCI	coordinateascent	NDCG@20		10	0.03	40	0.1	40	0.1
CP-CI	coordinateascent	NDCG@20		10	0.15	80	0.83	90	0.9
CP-NCI	coordinateascent	NDCG@20		10	0.03	40	0.1	40	0.1
EP-CI	coordinateascent	NDCG@20		30	0.22	90	0.77	90	0.77
EP-NCI	coordinateascent	NDCG@30		10	0.03	40	0.1	40	0.1
CP-CI	coordinateascent	NDCG@30		10	0.17	80	0.82	90	0.9
CP-NCI	coordinateascent	NDCG@30		10	0.03	40	0.1	40	0.1
EP-CI	coordinateascent	NDCG@30		10	0.09	30	0.2	50	0.4
EP-NCI	lambdamart	NDCG@10	30	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@10	30	50	0.56	90	0.91	90	0.91
CP-NCI	lambdamart	NDCG@10	30	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@10	30	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	NDCG@10	20	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@10	20	50	0.56	50	0.56	60	0.6
CP-NCI	lambdamart	NDCG@10	20	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@10	20	30	0.17	60	0.54	70	0.73
EP-NCI	lambdamart	NDCG@10	10	30	0.09	40	0.1	100	1
CP-CI	lambdamart	NDCG@10	10	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@10	10	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@10	10	40	0.23	60	0.53	70	0.72
EP-NCI	lambdamart	NDCG@10	5	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@10	5	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@10	5	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@10	5	40	0.3	50	0.41	70	0.74
EP-NCI	lambdamart	DCG@10	30	40	0.09	100	1	100	1
CP-CI	lambdamart	DCG@10	30	30	0.41	50	0.56	60	0.61
CP-NCI	lambdamart	DCG@10	30	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	DCG@10	30	40	0.2	70	0.56	80	0.74
EP-NCI	lambdamart	DCG@10	20	10	0.03	40	0.1	40	0.1
CP-CI	lambdamart	DCG@10	20	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	DCG@10	20	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	DCG@10	20	40	0.2	70	0.56	80	0.74
EP-NCI	lambdamart	DCG@10	10	40	0.09	100	1	100	1
CP-CI	lambdamart	DCG@10	10	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	DCG@10	10	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	DCG@10	10	40	0.2	70	0.56	80	0.74
EP-NCI	lambdamart	DCG@10	5	40	0.09	100	1	100	1

Table B.3: Selections induced by each configuration

CP-CI	lambdamart	DCG@10	5	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	DCG@10	5	40	0.09	40	0.09	40	0.09
EP-CI	lambdamart	DCG@10	5	50	0.21	70	0.57	90	0.86
EP-NCI	lambdamart	MAP	30	40	0.09	40	0.09	40	0.09
CP-CI	lambdamart	MAP	30	40	0.09	40	0.09	40	0.09
CP-NCI	lambdamart	MAP	30	40	0.09	40	0.09	40	0.09
EP-CI	lambdamart	MAP	30	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	MAP	20	40	0.09	40	0.09	40	0.09
CP-CI	lambdamart	MAP	20	40	0.09	40	0.09	40	0.09
CP-NCI	lambdamart	MAP	20	40	0.09	40	0.09	40	0.09
EP-CI	lambdamart	MAP	20	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	MAP	10	40	0.09	40	0.09	40	0.09
CP-CI	lambdamart	MAP	10	40	0.09	40	0.09	40	0.09
CP-NCI	lambdamart	MAP	10	40	0.09	40	0.09	40	0.09
EP-CI	lambdamart	MAP	10	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	MAP	5	40	0.09	40	0.09	40	0.09
CP-CI	lambdamart	MAP	5	40	0.09	40	0.09	40	0.09
CP-NCI	lambdamart	MAP	5	40	0.09	40	0.09	40	0.09
EP-CI	lambdamart	MAP	5	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	NDCG@20	30	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@20	30	30	0.44	70	0.73	90	0.92
CP-NCI	lambdamart	NDCG@20	30	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@20	30	40	0.22	60	0.45	70	0.67
EP-NCI	lambdamart	NDCG@20	20	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@20	20	50	0.59	70	0.7	70	0.7
CP-NCI	lambdamart	NDCG@20	20	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@20	20	60	0.47	60	0.47	70	0.66
EP-NCI	lambdamart	NDCG@20	10	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@20	10	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@20	10	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@20	10	40	0.22	60	0.51	80	0.83
EP-NCI	lambdamart	NDCG@20	5	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@20	5	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@20	5	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@20	5	40	0.24	60	0.53	70	0.71
EP-NCI	lambdamart	NDCG@30	30	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@30	30	30	0.41	70	0.73	90	0.91
CP-NCI	lambdamart	NDCG@30	30	10	0.03	40	0.1	40	0.1
EP-CI	lambdamart	NDCG@30	30	50	0.36	70	0.67	90	0.92
EP-NCI	lambdamart	NDCG@30	20	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@30	20	50	0.56	50	0.56	60	0.6
CP-NCI	lambdamart	NDCG@30	20	40	0.1	40	0.1	100	1
EP-CI	lambdamart	NDCG@30	20	50	0.36	70	0.71	70	0.71
EP-NCI	lambdamart	NDCG@30	10	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@30	10	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@30	10	40	0.1	40	0.1	100	1
EP-CI	lambdamart	NDCG@30	10	40	0.09	40	0.09	40	0.09
EP-NCI	lambdamart	NDCG@30	5	40	0.09	100	1	100	1
CP-CI	lambdamart	NDCG@30	5	40	0.15	40	0.15	40	0.15
CP-NCI	lambdamart	NDCG@30	5	40	0.1	40	0.1	100	1
EP-CI	lambdamart	NDCG@30	5	50	0.42	50	0.42	100	1
EP-NCI	mart	NDCG@10	30	40	0.09	40	0.09	100	1

Table B.3: Selections induced by each configuration

CP-CI	mart	NDCG@10	30	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@10	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	NDCG@10	30	70	0.55	90	0.86	100	1
EP-NCI	mart	NDCG@10	20	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@10	20	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@10	20	40	0.1	40	0.1	100	1
EP-CI	mart	NDCG@10	20	60	0.43	80	0.8	100	1
EP-NCI	mart	NDCG@10	10	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@10	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@10	10	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@10	10	60	0.41	60	0.41	100	1
EP-NCI	mart	NDCG@10	5	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@10	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@10	5	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@10	5	50	0.25	60	0.4	100	1
EP-NCI	mart	ERR@10	30	40	0.09	40	0.09	100	1
CP-CI	mart	ERR@10	30	20	0.18	70	0.84	100	1
CP-NCI	mart	ERR@10	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	ERR@10	30	70	0.55	90	0.86	100	1
EP-NCI	mart	ERR@10	20	40	0.09	40	0.09	100	1
CP-CI	mart	ERR@10	20	20	0.18	70	0.84	100	1
CP-NCI	mart	ERR@10	20	40	0.1	40	0.1	100	1
EP-CI	mart	ERR@10	20	60	0.43	80	0.8	100	1
EP-NCI	mart	ERR@10	10	40	0.09	40	0.09	100	1
CP-CI	mart	ERR@10	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	ERR@10	10	40	0.09	40	0.09	100	1
EP-CI	mart	ERR@10	10	60	0.41	60	0.41	100	1
EP-NCI	mart	ERR@10	5	40	0.09	40	0.09	100	1
CP-CI	mart	ERR@10	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	ERR@10	5	40	0.09	40	0.09	100	1
EP-CI	mart	ERR@10	5	50	0.25	60	0.4	100	1
EP-NCI	mart	DCG@10	30	40	0.09	40	0.09	100	1
CP-CI	mart	DCG@10	30	20	0.18	70	0.84	100	1
CP-NCI	mart	DCG@10	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	DCG@10	30	70	0.55	90	0.86	100	1
EP-NCI	mart	DCG@10	20	40	0.09	40	0.09	100	1
CP-CI	mart	DCG@10	20	20	0.18	70	0.84	100	1
CP-NCI	mart	DCG@10	20	40	0.1	40	0.1	100	1
EP-CI	mart	DCG@10	20	60	0.43	80	0.8	100	1
EP-NCI	mart	DCG@10	10	40	0.09	40	0.09	100	1
CP-CI	mart	DCG@10	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	DCG@10	10	40	0.09	40	0.09	100	1
EP-CI	mart	DCG@10	10	60	0.41	60	0.41	100	1
EP-NCI	mart	DCG@10	5	40	0.09	40	0.09	100	1
CP-CI	mart	DCG@10	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	DCG@10	5	40	0.09	40	0.09	100	1
EP-CI	mart	DCG@10	5	50	0.25	60	0.4	100	1
EP-NCI	mart	MAP	30	40	0.09	40	0.09	100	1
CP-CI	mart	MAP	30	20	0.18	70	0.84	100	1
CP-NCI	mart	MAP	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	MAP	30	70	0.55	90	0.86	100	1
EP-NCI	mart	MAP	20	40	0.09	40	0.09	100	1

Table B.3: Selections induced by each configuration

CP-CI	mart	MAP	20	20	0.18	70	0.84	100	1
CP-NCI	mart	MAP	20	40	0.1	40	0.1	100	1
EP-CI	mart	MAP	20	60	0.43	80	0.8	100	1
EP-NCI	mart	MAP	10	40	0.09	40	0.09	100	1
CP-CI	mart	MAP	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	MAP	10	40	0.09	40	0.09	100	1
EP-CI	mart	MAP	10	60	0.41	60	0.41	100	1
EP-NCI	mart	MAP	5	40	0.09	40	0.09	100	1
CP-CI	mart	MAP	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	MAP	5	40	0.09	40	0.09	100	1
EP-CI	mart	MAP	5	50	0.25	60	0.4	100	1
EP-NCI	mart	NDCG@20	30	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@20	30	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@20	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	NDCG@20	30	70	0.55	90	0.86	100	1
EP-NCI	mart	NDCG@20	20	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@20	20	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@20	20	40	0.1	40	0.1	100	1
EP-CI	mart	NDCG@20	20	60	0.43	80	0.8	100	1
EP-NCI	mart	NDCG@20	10	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@20	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@20	10	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@20	10	60	0.41	60	0.41	100	1
EP-NCI	mart	NDCG@20	5	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@20	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@20	5	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@20	5	50	0.25	60	0.4	100	1
EP-NCI	mart	NDCG@30	30	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@30	30	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@30	30	10	0.03	40	0.1	40	0.1
EP-CI	mart	NDCG@30	30	70	0.55	90	0.86	100	1
EP-NCI	mart	NDCG@30	20	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@30	20	20	0.18	70	0.84	100	1
CP-NCI	mart	NDCG@30	20	40	0.1	40	0.1	100	1
EP-CI	mart	NDCG@30	20	60	0.43	80	0.8	100	1
EP-NCI	mart	NDCG@30	10	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@30	10	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@30	10	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@30	10	60	0.41	60	0.41	100	1
EP-NCI	mart	NDCG@30	5	40	0.09	40	0.09	100	1
CP-CI	mart	NDCG@30	5	20	0.17	70	0.76	90	0.92
CP-NCI	mart	NDCG@30	5	40	0.09	40	0.09	100	1
EP-CI	mart	NDCG@30	5	50	0.25	60	0.4	100	1

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